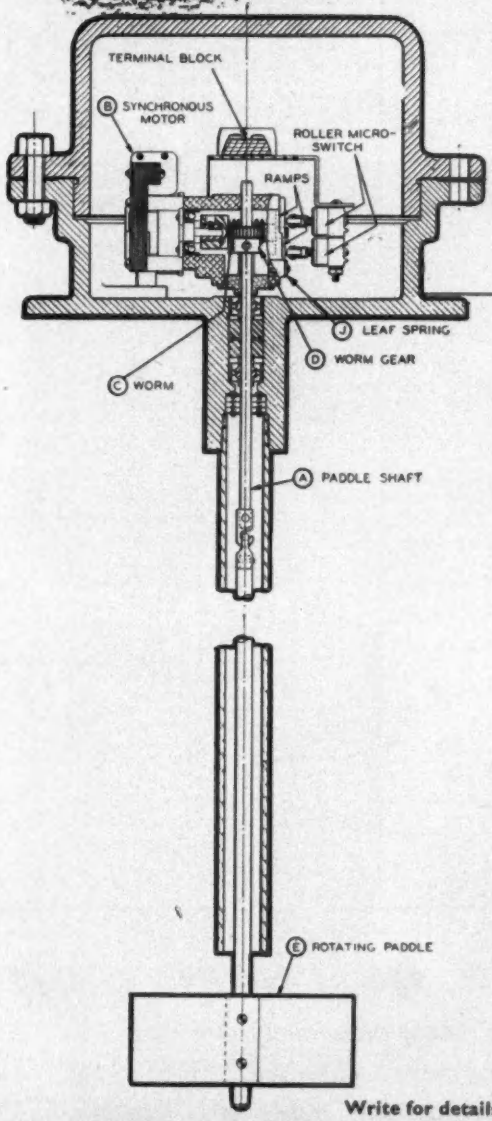
Chemical Age

INDEX TO ADVERTISERS

The first figures refer to advertisements in **Chemical Age Directory & Who's Who,** *the second to the current issue*

(Continued on page 164)

Controlled Flow



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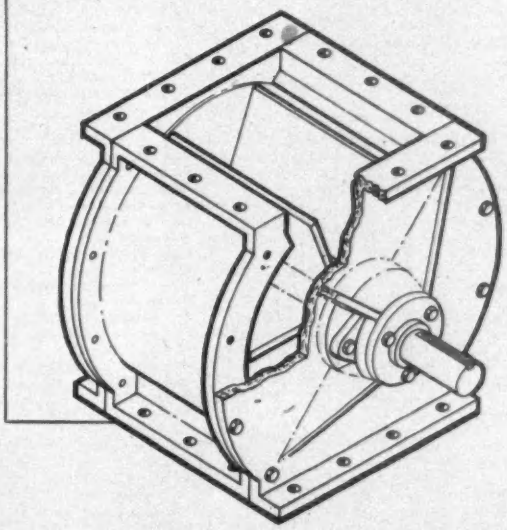

THE FULLER VANE-TYPE FEEDERS for handling pulverized and granular materials are employed wherever controlled flow and discharge of materials from bins, silos, etc., is required. They may be used as air locks for positive or negative pressure differentials and are available in capacity ranges to meet normal plant requirements and are built with circular or rectangular outlets.

Write for details of all Fuller pneumatic handling equipment including the F.H. Airslide*

*Reg. Trade Mark

[redacted]

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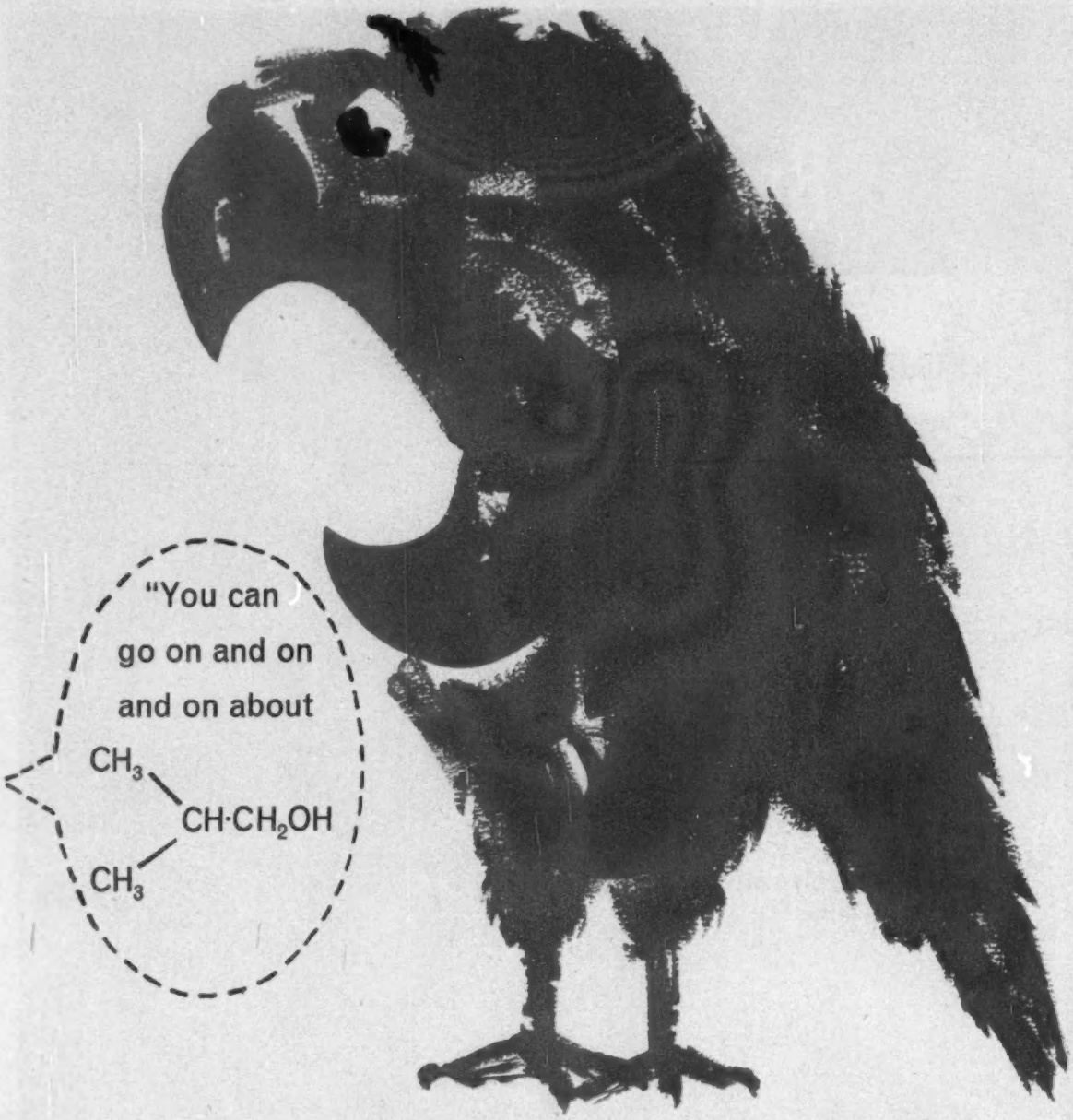


it'll always be Isobutyl Alcohol to me—
and I get it from I.C.I."

I.C.I. give prompt delivery of top-quality, top-performance solvents.

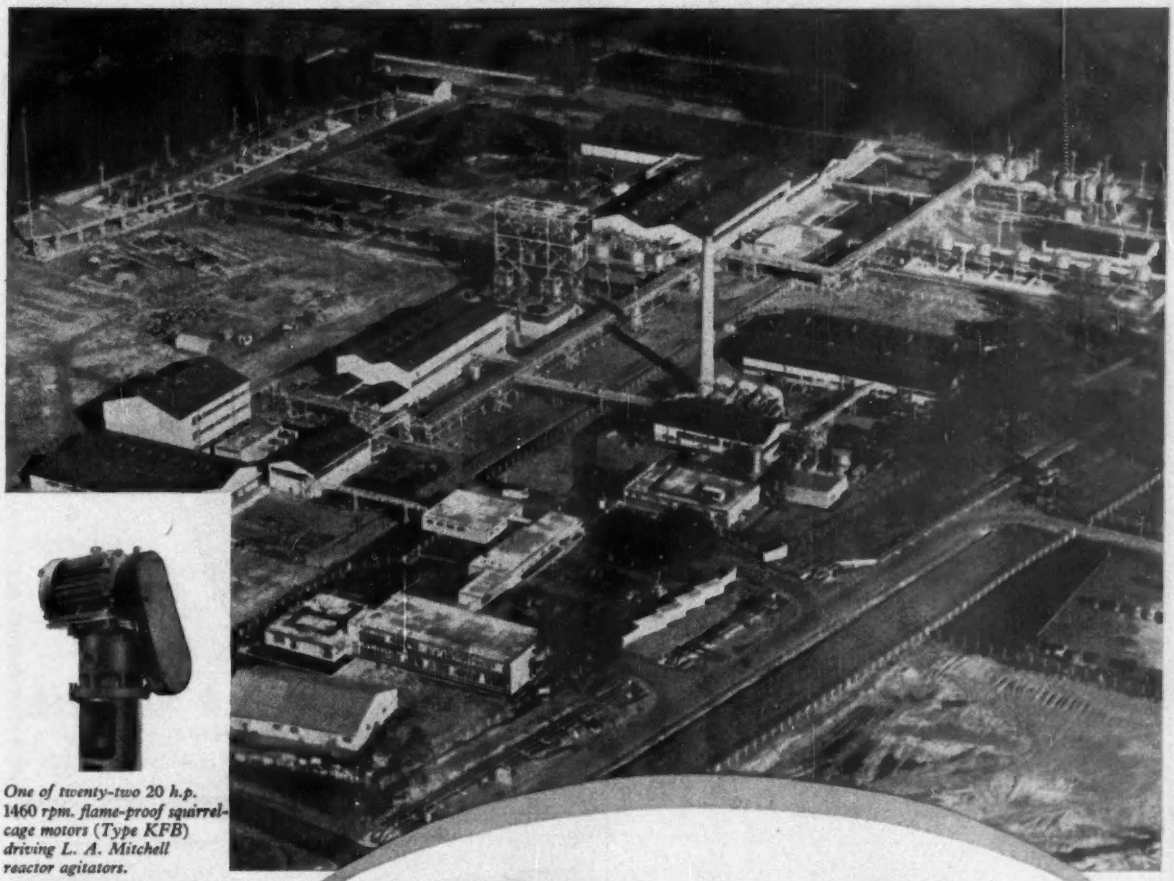
ISOBUTYL ALCOHOL NORMAL BUTANOL 'AROMASOL' H 'AROMASOL' L
ISOPROPYL ALCOHOL ACETONE 'IMSOL' A 'IMSOL' M

for full information,
or a visit from a representative,
get in touch with the
nearest I.C.I. Sales Office
or with

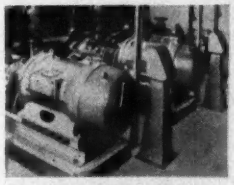
ICI

IMPERIAL CHEMICAL INDUSTRIES LIMITED, LONDON, S.W.1.

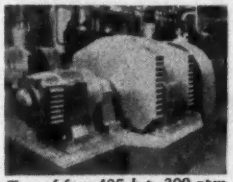
113-3



One of twenty-two 20 h.p. 1460 rpm. flame-proof squirrel-cage motors (Type KFB) driving L. A. Mitchell reactor agitators.



Two of four 100 h.p. 2920 r.p.m. squirrel-cage motors (Type HRSP), with pedestal control stations, driving water pumps.



Two of four 425 h.p. 300 rpm. salient pole synchronous motors (Type SM) with overhung exciter driving L. Sterne's refrigeration compressor.

Over 650 AEI Motors

for one of the world's most modern synthetic rubber plants

The new plant of the International Synthetic Rubber Company at Hythe is capable of producing 70,000 tons of synthetic rubber a year using butadiene and styrene as the main raw materials. Three grades of rubber are produced suitable for making motor vehicle tyres, coloured rubber products and general products. The motors ranging from 0.25 to 620 h.p. and used for driving pumps and compressors, were all supplied by AEI. In addition, AEI made and erected the switchgear, transformers and other substation equipment for this plant.

AEI

Associated Electrical Industries Limited

Motor and Control Gear Division

RUGBY & MANCHESTER

A5590

B

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A Shell Chemical's chemist.

What are you making?

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Do Shell make secondary-what-you-said?

I'll say they do—and they have a super delivery service.

SHELL CHEMICAL COMPANY LIMITED

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GLASGOW	Royal London House, 48-54, West Nile Street, Glasgow, C.1. Tel: City 3391
BELFAST	16-20, Rosemary Street, Belfast, Northern Ireland. Tel: Belfast 26094
DUBLIN	33-34, Westmoreland Street, Dulbin, Republic of Ireland. Tel: Dublin 72114

VOL. 85 No. 2168
JANUARY 28 1961

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IN THIS ISSUE

Annual subscription is: home, 52s 6d, overseas, 60s, single copies 1s 6d (by post 1s 9d)

CHEMICAL AGE

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TEACHING CHEMISTRY

INADEQUACY of grammar school provision for the practical teaching and study of chemistry is one of the disturbing elements of a report published recently on behalf of the Science Masters' Association. The report, based on a survey conducted jointly by the Science Masters' Association, the Association of Women Science Teachers, the National Union of Teachers and the Joint Four Associations, reveals some improvements since an earlier survey in 1957, but it also shows that many of the critical difficulties remain.

Generally, it is still true that the facilities provided in boys' and mixed schools are better than those in girls' schools. Sixth-formers specialising in science in girls' schools—usually less than one half that in boys' schools—still show a tendency to concentrate on biology rather than chemistry or physics. The report concludes that too few girls are specialising in science which means that the great shortage of scientists in the U.K. is unlikely to be mitigated from this source; also there will be too few science teachers in girls' schools in the future. Of the 60% of sixth-form boys specialising in science, it appears that many are dropping the subject completely too soon.

Even where science is studied at sixth form level, there is a general inadequacy of laboratory space, equipment and staff, the situation again being particularly bad in girls' schools. Most science teachers spend too much time preparing equipment and carrying out other duties which could be performed by a laboratory technician.

While chemistry is essentially a practical subject and the provisions for a sound grounding in experimental techniques must be improved, another inadequacy in the teaching of chemistry—that of an outmoded theoretical approach—is causing concern in a number of quarters.

In a paper published in the January edition of the *Journal* of the Royal Institute of Chemistry, a survey of the situation is made by E. J. Rothery, lecturer in chemistry at the College of Technology, Dublin. The author comments that, although a scientist has been described as a person who is always dissatisfied with things as they are, chemical education appears to possess some strange inertia. Outmoded theories such as the phlogiston theory and outmoded approaches to fundamental principles such as the attempt to gain an understanding of atomic weight through the obsolete concept of equivalent weight and the laws of Dulong and Petit, still appear in many textbooks and on many syllabuses.

A seminar was held recently under the auspices of the Organisation for European Economic Co-operation in an attempt to achieve the following objects: a revision of chemistry syllabuses based on a knowledge of the atom; pruning of the subject matter so as to give more time to fundamentals without neglecting experimental work; and teaching chemical principles in such a way that they play a role in training the intellect of the pupil.

Important changes have already been made in many countries. In Sweden, Denmark and Switzerland, the Bronsted acid-base theory is used at an early stage and concepts of electronegativity are applied to a considerable extent. Valency is explained solely from electronic configuration and atomic weight is derived from physics making the concept of equivalent superfluous.

(*Continued on next page*)

Steep Rise in B.O.C. Capital Spending Due to Steelmakers' Call for Tonnage Oxygen Plants

THE three-year programme of capital spending of the British Oxygen Co. Ltd. is now over £40 million, compared with £28 million a year ago. The steep rise is due mainly to additional contracts obtained in 1960 for the supply of process oxygen for steelmaking.

This is stated by Mr. J. S. Hutchison, B.O.C. chairman, is his annual statement for the year to 30 September 1960, which is to be presented at the annual meeting on 15 February. (See also 'Commercial News', p. 194.)

Almost all the steelmaking business in the past year went to B.O.C. in the form of supply of oxygen from special plants owned by British Oxygen, rather than steelmakers operating their own plants or purchasing their oxygen from B.O.C. Last year's figures of 2,200 tons/day of B.O.C. oxygen plant capacity in operation or under construction for tonnage use in steelmaking has now risen to 3,300 tons/day. Other long-term contracts are under discussion. (The group is supplying six of the nine tonnage plants now being built for U.K. steelmakers.)

Tremendous Future

There was a tremendous future for oxygen in iron and steelmaking, but optimism, said Mr. Hutchison, had to be tempered by an understanding of conditions. It took several years from the start of planning major installations to full operation and the customer might decide to purchase and operate his own oxygen plant. Competition in the tonnage oxygen business was as severe as ever and it had to be appreciated that these aspects governed the profit obtainable by operating such costly plant units under contract over a period of years.

Engineering Division. The chemical plant works at Edmonton were still fully occupied on the plant building programme for B.O.C.'s own needs for oxygen for general purposes as well as for steelmaking and on completion and commissioning plants built for customers. The major contract for installations at the Government rocket research station, Spadeadam, was completed to schedule, but that project was now in abeyance.

Work was now in hand on the building of 19 tonnage oxygen plants and nitrogen plants, mostly for operation by B.O.C., and having a value of £10.5 million.

Chemicals Division. B.O.C. had an excellent year in chemicals with melamine and polyvinyl acetate both making substantial progress. Higher turnover and improved manufacturing efficiency enabled melamine prices to be cut, preparing the way further to meet competition at home and increased difficulties in exports. It was hoped to maintain the improved position in melamine.

Introduction of new and improved brands of polyvinyl acetate emulsions brought a big increase in sales; further development was expected this year.

Research and Development. Arrangements had recently been completed for the production of hydrogen and helium in liquid form. While uses were still small in volume, they were vital for many special scientific applications where the ability to reach temperatures near absolute zero, −273°C, was of prime importance.

Prospects. Volume increase was unlikely to keep pace with higher costs and some decline in profit margins seemed certain in the first part of the year. A part of the company's energies will be concentrated on bringing large new production units into operation. Overseas trading, again responsible for half the total profits, should continue to expand and to make an increased contribution to group earnings.

Teaching Chemistry

(*Continued from page 173*)

In the U.S. even more drastic reorganisation is taking place. It was decided at a conference held in 1957 that a beginners' course in chemistry should have a central recognisable theme and the logical choice was the 'chemical bond'. Several schools are now giving the course a trial.

It is futile to prepare young chemists for the atomic age with methods and techniques that belong to a bygone age in chemistry. If the shortage of scientists in the U.K. is ever to be overcome, a new approach is needed to the teaching of chemistry, particularly in girls' schools. More money must be spent by local authorities in providing adequate equipment and laboratory facilities. Also urgently needed is a revision of syllabuses to give an approach to fundamentals based on modern concepts (the principles of wave mechanics and quantum theory; electronegativity; oxidation and reduction; and acid-base theory and chemistry of non-aqueous solutions).

Chemical Capital Spending at Low Ebb, but Upward Swing Expected

FIXED capital spending in the chemical and allied industries in the third quarter of 1960 totalled £34 million, compared with £31.6 million in the same period of 1959. The total for the first nine months, £101.9 million, was the lowest since 1955. Comparable January-September figures were: 1959, £113 million; 1958, £149.5 million; 1957, £141.1 million; 1956, £112 million; 1955, £77.4 million.

The following is an extract from the Board of Trade's statistics on capital expenditure:

Fixed Capital Spending in the Chemical and Allied Industries

	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	Year
1955 ...	22.9	25.8	28.7	38.8	116.2
1956 ...	34.9	36.5	40.6	49.3	161.3
1957 ...	45.4	48.0	47.7	54.5	195.6
1958 ...	50.7	50.5	48.3	55.5	205.0
1959 ...	41.5	39.9	31.6	40.4	153.4
1960 ...	34.3	33.6	34.0	—	—

In each previous year, except 1959, fourth quarter spending in the chemical and allied industries has been the highest of the year, and the final 1960 figure should read £140 million. Many major chemical plant projects were announced during 1960 and investment on their construction, much of which started in the last part of last year, will continue to mount during 1961.

Whether the final 1961 figure will top the record 1958 expenditure of £205 million remains to be seen, but at end-December, 1960, I.C.I. had sanctioned capital expenditure worth £51 million, compared with about £40 million a year earlier. Three-year programme of capital spending by the British Oxygen Co. Ltd. now totals more than £40 million, compared with £28 million a year ago.

Turner and Newall's £19 M. Bid for B.I.P.

AFTER several days of strong rumours, the company making a take-over bid for British Industrial Plastics Ltd. was revealed to be Turner and Newall Ltd., Manchester-based manufacturers of asbestos, magnesia and allied products who, through their home and overseas subsidiaries, have interests in plastics and chemicals. Their offer is for a cash and share exchange worth some £19 million for the ordinary capital of B.I.P. Terms will be one £1 ordinary share of Turner and Newall plus 28s in cash for every seven 2s ordinary shares in B.I.P.

B.I.P. produce moulding powders, synthetic resin adhesives and a wide variety of specialised resins, as well as plastics moulding machinery and tools. In 1959-60, the group achieved a record increase in turnover, from £7.8 million to £9.2 million, the margin of profit on sales reaching 12.3% compared with about 10% in the four preceding years. The directors' proposal to raise fresh capital by a 'rights' issue was referred to in CHEMICAL AGE, 7 January, p. 20.

Project News

F. W. to Supervise Construction of Yugoslav Chemical Complex

A $35 million petrochemical complex is to be built at Zagreb in Yugoslavia, with FOSTER WHEELER CORPORATION supervising construction. The complex will produce desulphurised benzene, cumene, ethylbenzene, styrene monomer, polystyrene, phenol, acetone, ethylene and polythene. The units will be built for Orgnasko Kemijska and will be financed by interests in the U.K., U.S. and Yugoslavia.

The polythene plant will be built by Simon-Carves Ltd. in conjunction with I.C.I., who have for some years licensed their high-pressure process to overseas producers (see CHEMICAL AGE, 4 June 1960, p. 909). The Distillers Company, who have a cumene-phenol process, are not concerned with this project; neither are Hercules Powder, D.C.L. partners in the development of the process. It is assumed that the Yugoslav plant will be based on Soviet cumene-phenol know-how.

£1 m. Perspex Expansion Will Raise Capacity by 3,000 T.P.A.

● The 50% extension to the Wilton Perspex acrylic sheet plant of I.C.I. PLASTICS DIVISION which came on stream early last year is to be followed by a 3,000 tons/year plant which will raise capacity by 1962 to 20,000 tons/year. Cost will be £1 million and construction will be handled by I.C.I.

Present combined capacity of Perspex plants at Billingham, Wilton and Darwen is 17,000 tons/year. Methyl methacrylate monomer production is being lifted to cope with the new expansion. At the end of 1960, Tees-side Perspex works were at maximum capacity and output was up by 50%.

£130,000 Contract for Whessoe Storage Tanks

● Contract worth more than £130,000 for the supply and erection of 17 storage tanks at Immingham Dock, Lincolnshire, has been awarded to WHESSOE LTD. by the Immingham Storage Company Ltd. The largest of these tanks are 96 ft. in diameter and 42 ft. high. Total capacity exceeds 61,780 water tons.

Graphic Control Panel for Grimsby TiO_2 Plant

● A graphic control panel which will supervise the final processing of titanium dioxide for extensive use in paint manufacture, has been produced at the Horsham, Sussex, factory of H. and E. Lintott Ltd., electro-mechanical engineers, for the Grimsby works of BRITISH TITAN PRODUCTS CO. Built to the designs of Peabody Ltd., combustion and chemical engineers, the control panel will need only one man to operate it.

The graphic control console gives a step-by-step picture of all stages of production, and automatically initiates its own safety devices and regulating mechanisms when any faults develop.

I.C.I. Argentine Polythene Project Officially Approved

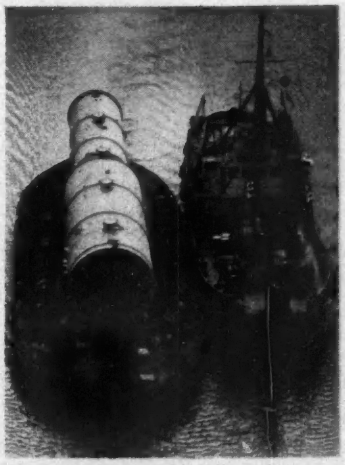
● The Argentine Government has given formal approval to the investment by IMPERIAL CHEMICAL INDUSTRIES LTD. of £5.76 million in a polythene plant in Buenos Aires. The money, to be spent through I.C.I.'s Argentine affiliated company, will be used for machinery, equipment, and spare parts.

As reported in CHEMICAL AGE, 9 July, p. 67, the 10,000 tons/year plant will use the I.C.I. high pressure polymerisation process using ethylene obtained locally.

Electro-Chemical to Supply Large Zinc Plating Plant

● ELECTRO-CHEMICAL ENGINEERING CO. LTD., Woking, have recently completed for a leading French steel manufacturer a zinc electro-deposition plant, one of the largest in the world. In the top of each tank there is a slotted tray made from Cobex rigid vinyl produced by BX Plastics Ltd., which is used because of its complete inertness to the chemical attack set up by electro-deposition of zinc on to steel sheet. The whole plant, which is fully automatic, was designed and built entirely by Electro-Chemical Engineering Co. Ltd., specialists in the field of automatic plating machinery.

H.W. Fractioning Column Bound for Pemex



Seen here at the start of its journey to the Minatitlan refinery, Mexico—part of the Pemex operations—is a crude fractionating column 16 ft. i.d. by 127 ft. 8 in. overall length and weighing 85 tons. Column was manufactured by Head Wrightson Teesdale Ltd., a subsidiary of Head Wrightson and Co. Ltd.

Humglas Catalytic Gas Plant for Australia

● A £1 million contract for the design and construction of a gas plant at West Melbourne, Australia, has been placed with HUMPHREYS AND GLASGOW LTD., London. This was announced by Mr. Ambrose Congreve, chairman of Humglas, through whose Australian office the contract was negotiated with the Gas and Fuel Corporation.

The plant will comprise two gas making sets and will be of the O.N.I.A.-G.E.G.I. cyclic catalytic type. It will use heavy oil or refinery gas and will be the first Australian plant of its kind to use heavy oil.

When using heavy oil the plant will produce 10 million cu. ft./day of gas. When reforming refinery gas it will have an output of 15 million cu. ft./day.

Design work has already begun and it is expected that the plant will be completed in about 18 months. The contract is for the complete gas plant with all its ancillaries and buildings.

Humglas have installed four carburetted water gas plants at the West Melbourne gas works and now have a contract for their modernisation and conversion for thermal reforming of refinery gas.

Increased Sales for U.K. Plastics Pipe Makers

Durapipe and Fittings Ltd., West Drayton, Middlesex, a member of the Incledon and Lamberts Group, and manufacturers of extruded plastics piping and what is claimed to be the world's largest range of moulded plastics fittings, pushed their U.K. sales up by 41.5% in the first eight months of 1960, as against the same period in 1959. During the first eight months of 1960 Durapipe produced over 500,000 ft. of non-corrosive thermoplastic pipe of all types, diameters and thicknesses and a quarter of a million fittings from a range of some 450.

Australian Duty on Nitro-Cellulose

The Australian Tariff Board have imposed a duty of 9d per lb. net weight on imports of industrial nitro-cellulose. The duty is temporary pending a full enquiry by the board into prospective needs of the local industry.

Laporte Cash and Share Offer for Howards

The bidder for Howards & Sons Ltd., was revealed on Thursday when the Directors of Laporte Industries Ltd. stated that an offer had been made to acquire all the issued capital of Howards on a cash and share basis.

The Directors of Howards will recommend acceptance of the offer.

★ THERE has seldom been so much speculation in print about a new plant project as there has for the major ammonia facility that was first announced by Sir Clavering Fison at the annual meeting last year. The project has been linked with refineries in South Wales and Whitegate, Eire, as well as Dublin.

All this must be rather harrowing to Fisons Fertilisers Ltd., the group company which will operate the plant, because as is usual in the early stages of any new development a number of sites are being studied and with a project like ammonia, other companies have to be negotiated with. This process is now in hand and it will continue until a site is chosen.

Doubtless the fact that there is unemployment in certain parts of South Wales and Eire has helped kindle rumour. Local authorities in both areas would welcome a major chemical plant, particularly as it could well be the first of many others.

★ A NOVEL application for Propathene, the polypropylene which I.C.I. are producing in their big new plant at Wilton, came to light at an exhibition of Propathene products in Manchester on 10 and 11 January. Among the new products shown was netting, produced from polypropylene which has been extruded in the form of a tube, similar to a tubular knitted fabric. This is quite an eye-opener, since it was thought until recently that it was impossible to produce an extruded net of this nature. But a Lancashire company, Blackburn Pioneer Mills Ltd., has come up (or perhaps I should say "coom oop") with the answer.

Their invention could have far-reaching effects in the dyeing section of the textile industry, since it seems that it may well replace stainless steel for the holding of yarn in pressure dyeing. The cost of fabricating stainless steel holders for pressure dyeing H.T. machines comes pretty high because of the intricate work involved.

★ THAT the Timber Development Association should observe that Billingham was "apparently in a chemical atmosphere" must have caused a great deal of amusement not only to I.C.I. but also to the inhabitants of Billingham, even though houses and urban council offices built downwind from chemical plants are being slowly corroded by acid fall out. It was a sample of rotted wood that led to the Timber Development Association's apt comment.

Corroded metal and rotted wood appear not to have affected relations between I.C.I. and Billingham. Apparently I.C.I., whose rates help to make the town the richest urban district in County Durham, are welcomed by the townsfolk. It's true that about a quarter of I.C.I.'s workers live within the urban district of Billingham and that I.C.I. own more than half as many houses as the council, but none of the I.C.I. houses are tied, and both I.C.I. and the town deny that Billingham is an organisation town.

While I.C.I. continue to spend vast sums of money on the suppression of air pollution and acid fall out, Billingham is making the most of the prosperity the industry has brought. The population is increasing, shops are going up and Billingham has been chosen as the site for Durham's first campus school. Billingham expects to be a town of prosperous people but people who have learnt their lesson—the council no longer builds houses downwind from chemical plants.

★ THE archaeological world is likely to be thrown into a something of a turmoil following discovery of an error in the value placed on the half-life of carbon-14. The U.S. National Bureau of Standards has given a more accurate value of 5,760 years, against a previously accepted 5,568 years. The Dead Sea scrolls, for instance, were previously dated at about 40 A.D. The new half-life gives them a date 60 years earlier.

However, the change is less than the previous experimental error. The value of 5,568 years was somewhat of an arbitrary choice. Because of the wide range in measured values of the half-life of C-14 a weighted average of three values determined by gas counting and by mass-spectrometric analysis was tentatively accepted for the radiocarbon dating of archaeological samples. The present measurements have led to the conclusion that the uncertainties in the values obtained experimentally may have arisen almost entirely from adsorption effects.

Redetermination of the half-life was carried out by quantitatively diluting high-specific-activity carbon dioxide for counting in length-compensated internal gas counters in the Geiger and proportional regions. Mass-spectrometric analyses of parts of the undiluted gas samples were made to determine the isotopic abundance of carbon-14, which was found to be about 44 atoms %.

★ DESPITE the trend towards closer automatic control of industrial processes, many engineers and plant managers still look dubiously at some of the newer continuous on-stream analytical instruments, such as chromatographs, mass spectrometers, infra-red analysers and the like. One American petroleum company, which has been using a process chromatograph on a depropaniser column for the past two years, has computed the improved results obtained in terms of the cost of the control system. The cost of this is recovered every two weeks by increased product recovery, every six weeks by improved product quality and every seven months by reduced utility consumption.

This example was given in a special *Financial Times* survey of 'Electronics and automation' last week by Mr. C. A. Laws, joint general manager of Elliott Brothers (London) Ltd. He points out that any one of these returns would have been sufficient to justify the installation, quite apart from the fact that it is a positive step towards full plant integration.

★ THE good old days—or were they?—not according to a recent issue of the *Albright News* which, quoting from a Canadian magazine *Municipal World*, brings to light some of the aspects of early Canadian life that may have been overlooked by those who regard with nostalgia the more "leisured" centuries past.

A list of rules for the office drawn up by one employer of the 1870's reminds clerks that they must daily sweep the floors, dust the furniture and shelves, fill the lamps, clean the chimneys and trim the wicks, and bring a bucket of water and a scuttle of coal for the day's business. Even leisure was strictly controlled (the office was open from 7 a.m. to 8 p.m. six days a week); each employee was expected to spend his time outside office hours reading the Bible or other good books and the Sabbath in going to church.

Men employees could expect a little fun, however; they were given one evening off a week for the purpose of courting. (I don't know what the girls were supposed to do.) And—the employee who had performed his labours faithfully, and without fault for a period of five years was given an increase of five cents a day, provided he did not smoke Spanish cigars, use liquor in any form, or get shaved in a barber's shop, and also provided a just return in the profits from the business permitted it.

A far cry from the days when employees lived on the job is the incident, brought to my notice recently, of the girl employees of a Derby manufacturing chemists, who complained to the management that the corporation buses either got them to the factory too early or too late. The company investigated the early morning services and, finding them inadequate, decided to run a special bus. The company had been loosing thousands of pounds through the girls arriving late.

Good old days!

Alembic

SIX YEARS OF SOVIET RESEARCH ON METHANE LIQUEFACTION, STORAGE

TWO years hence natural gas from the Sahara may be reaching the U.K. by tanker. The problems of transporting liquid methane have been overcome as shown by the successful journeys of the joint Conch-Gas Council's tanker *Methane Pioneer*.

What is not so well known is the work that has been carried out on methane liquefaction, storage and regasification, and the country with the most experience in these fields is the U.S.S.R.

The Moscow works have been in operation since mid-1954 and is the only works in the world in which natural gas has been liquefied for the past six years and liquid methane stored in bulk and regasified for transmission through trunk pipelines to gas consumers during peak load periods. Further, liquid methane is transported from the Moscow works in road tankers beyond the radius of gas utility distribution systems, the engines of the vehicles being fuelled from the tankers' boil-off gas.

As a result of an agreement between V/D Technopromimport and the Stacey-Dresser Engineering Co., Cleveland, Ohio, complete equipment for natural gas liquefaction, storage of liquid gas and regasification was furnished by Stacey-Dresser to the Soviet organisation.

Layout and mode of operation of the Moscow plant followed the design of the liquefaction, storage and regasification of the plant built in Cleveland in 1941, with a few exceptions.

Purification of the gas follows conventional lines. The acidic gases are removed in an absorption column with a solution comprising monoethanolamine 20%, diethylene glycol 75% and water 5%. The regenerated solution is recycled by an electrically driven plunger pump. The product, containing 0.005 to 0.008% carbon dioxide and a trace of hydrogen sulphide, is dried with activated alumina to a dew point of about −40°C before admission to the compressors and liquefaction unit. The amount of gas to be liquefied can be regulated by an automatic control which alters the compression pressure through the agency of the gas pressure at the inlet to the third compression stage. The amount of ammonia circulating, and consequently the degree of coldness produced in the ammonia system, is regulated to a great extent by variation of the compressors' speed between 150 and 300 r.p.m. Regulation values of stainless steel were fabricated by the U.S.S.R. Bureau of Construction and Petroleum Industry, and operate at low temperatures. Experience has shown that all working parts and pressure regulators are quite safe in use at temperatures between −30 and −160°C.

Line compressors, supplied by Clark Brothers, are the 600 h.p., 300 r.p.m. gas engine-powered type, each having six engine cylinders and two compression cylinders. Two units compress the natural gas, two the ethylene and one the ammonia.

It is reported that the Russian plant varies from the original U.S. design in that butane and propane are removed from the compressed natural gas early in the liquefaction cycle. Between the methane condensers is a condensation column which serves to separate heavy hydrocarbons from the gas. At full capacity it is reported that the plant produces 70 tonnes a day of liquid natural gas.

Experimental Unit

An experimental storage unit was erected in 1954 consisting of four vertical cylinders in an insulated, gas-tight, sheet metal, cylindrical shell. Each had a geometric volume of 86 cu. m. which, filled to 90% with liquid methane, could contain 32.5 tonnes of liquid. Total operating capacity was 130 tonnes.

Of welded construction and made of a titanium stabilised grade of stainless steel, the cylinders had a working pressure of 9 to 12 p.s.i. To prevent moisture lowering the insulants' properties, the air in the envelope was purged with dry natural gas before the cylinders received their first fill of liquid methane and thereafter natural gas in the shell was kept under a pressure of 20 to 50 mm. of water above atmospheric.

Instead of cork as an insulant, the Russians used a plastics foam—Mipora (formaldehyde 72.2%, urea 27.3%, sodium acetate 0.5%) in the form of blocks built around the cylinders.

From this experimental unit a much larger unit was erected containing 42 cylinders to provide storage capacity for 1,200 tonnes of liquid.

In the regasification unit the liquid is first compressed from 0.8 to 14 atmospheres by a special centrifugal pump, and then gasified in heat exchangers by circulated hot water so that the exit gas at substantially atmospheric temperature enters the trunk gas line at a pressure sufficient to move it to its destination.

Research in the U.S.S.R. had evolved by 1957 a system for the regeneration of the 'cold' available when liquid methane is regasified. This requires the use of an intermediate cold-exchanger and a mixture of hydrocarbons, e.g. pentane-hexane. As the liquid natural gas evaporates, the mixture of hydrocarbons is cooled to low temperatures and stored in a thermally insulated container; the 'cold' so recovered is then used in the liquefaction of more natural gas. This substantially reduces the power consumption required for liquefaction.

Apart from the cost of the natural gas treated, the cost of power consumed by liquefaction, the cost of purifying and drying the gas, and depreciation charges account for a large part of the operating costs. Where the gas enters the plant at pressures of below 10 atmospheres, it is preferable for large plants to employ the cascade principle using ammonia and ethylene, propane or propylene, as the refrigerants. The cascade type of plant is more complicated to operate than one using precooling and circulation of the gas at medium pressure, but less power is required for liquefaction with the cascade plant at the pressures below 10 atmospheres.

Utilities and Chemicals Used to Produce 1 cu. m. of Methane at −161.4°C and 760 mm.

Natural gas 57 Nm^3
Electricity 320 kWh
Steam 5 kg.
Water 0.9 mm^3

Refrigerants
Ethylene 92 g.
Ammonia 60 g.

Acid Gas Removers
Ethylene glycol 50 g.
Monoethanolamine 42 g.

Peptide Molecule Synthesis May Lead to ACTH Production Cost Cuts

THE recent synthesis of peptide molecules containing 23 of the 39 amino acids which go to make up natural ACTH (adrenocorticotropic hormone) is a considerable success for pharmaceutical research. It points the way to a more economical method of manufacturing ACTH in large quantities and to the possibility of providing a drug devoid of the additional substances contained in the natural hormone and hence devoid of undesirable side-effects.

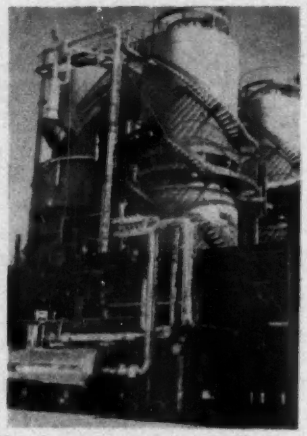
The synthesis of this large peptide molecule was reported in December by Professor Klaus Hofmann of the University of Pittsburg. Slightly smaller peptide molecules but with a high degree of activity were described in a paper presented last October at a meeting of the Natural Science Society in Zurich. During the course of research undertaken at the CIBA laboratories, Professor R. Schwyzer and his co-workers succeeded in synthesising in 63 steps a peptide with 19 of the required amino acids, one mg. of which displayed an activity equivalent to that of 20 to 30 international units, producing an effect which approaches that of natural ACTH.

A similar synthesis was announced in November by a U.S. team working at the University of California under the direction of C.H. Li. In this instance the peptide produced also contained 19 amino acids and showed a similar degree of activity.

Hypalon Used as Anti-corrosive Coating in French Gas Works

CONSIDERABLY prolonged corrosion resistance has been imparted the surfaces of catalytic cracking units at the Genevilliers, Landy and Alfortville works of Gaz de France, the French nationalised gas industry, by the use of Hypalon synthetic rubber coatings. A total of some 20,000 sq. m. of catalytic cracker surfaces have been Hypalon protected at these three works. Previous protection systems had not lasted for more than a few months.

Test coatings were first applied in 1959 at the Cornillon works on the outskirts of Paris. Here, Hypalon was applied to the exterior surfaces of storage tanks containing ammoniacal water. This liquid, containing phenolic oils, tars and other waste products, had spilled over the sides of the tanks causing stains, but the Hypalon coating remained intact. As a further test, six tanks containing concentrated sulphuric acid were also coated on the outside with Hypalon. Some time later, due to the accidental fracturing of the piping, 98% concentrated acid trickled down the walls of these tanks for 24 hr. Even in these circumstances, no repairs to the Hypalon coating were found necessary on examination.



Hypalon protected cat crackers at Gennevilliers, near Paris

As a result of these tests, all sulphuric acid installations at these works will be protected with Hypalon 30, which is designed principally for use in solution coatings on rigid substrates. In all cases, these coatings were applied by Gaz de France after careful pre-treatment of metal surfaces had been carried out by sand- or grit-blasting.

Hypalon coating materials are produced by E. I. Du Pont de Nemours in the U.S. and available in the U.K. through their subsidiary, Du Pont Co. (United Kingdom) Ltd.

B.P.'s First Canadian Refinery is Model of Compactness

THE recent official opening of their $45 million refinery near Montreal, which went on stream early in 1960, completes the integration of the BP Group of companies in Canada. BP have held exploration interests in Canada since 1953; a marketing company, BP Canada Ltd., was formed in February 1957 and this was followed in 1958 by the formation of BP Refinery Canada Ltd., who are operating the Montreal refinery, BP's first in Canada.

Covering 250 acres of a 600-acre site at the east end of Montreal Island, the refinery has a capacity of 250,000 bbl./day of crude. It includes a combined atmospheric and vacuum distillation unit, a desulphurisation unit for treating light distillates, a catalytic reforming unit, a catalytic cracker with vapour recovery section, and a catalytic polymerisation unit. Subsidiary facilities include a copper chloride treating unit for sweetening gasoline. The process units are served by 55 storage tanks. The refinery uses some 2 million gall./hr. of cooling water and up to 180,000 lb./hr. of high-pressure steam.

An unusual feature is the compact design of the refinery with process units built closely together so that streams of products flow directly from one unit to the next without passing through storage tanks. All major process units are placed on either side of one central overhead pipe track.

Site work for the refinery began in April 1958, engineering and construction being handled by the Lummus Company Canada Ltd., Montreal, in conjunction with the Lummus Co. Ltd., London, to BP's specifications. Over 50 Canadian companies acted as sub-contractors, employing 2,500 workers at the peak of construction. Over 80% of the total $45 million cost was spent in Canada.

Soil Problems to be Discussed

The Royal Institute of Chemistry, the Institute of Physics and the Physical Society, and the Institute of Biology are to hold a symposium on the problems raised by the use and misuse of soil at Senate House, London, on 15 March. The subjects to be discussed will include: 'Chemical aspects of soil fertility and crop production'; and 'The interaction of agricultural practice and the soil fauna'.

Will

Mr. Sidney Robert Mansfield, former chairman and managing director of Polak and Schwarz Ltd., essential oil distillers, who died on 23 November, aged 65, left £44,619 net (duty paid £15,098).

U.K. Firm Interested in N.R.D.C. Process for Acetylene-from-methane

COMPANIES in the U.K., U.S. and Europe, are interested in the development of the National Research and Development Corporation's acetylene process. This process is based on the partial combustion of methane and, according to the 11th annual report of the N.R.D.C. published on 24 January, is now ready for further development in conjunction with an industrial firm.

Organo-metallic compounds, developed by Dr. Bryce-Smith and similar in structure to the well-known Grignard reagents, are considered to be of potential industrial interest since they can be prepared in cheaper solvents, even kerosene, instead of dry ether, which is the chief draw back to producing Grignard reagents commercially. The original interest in this type of compound was that it was found to catalyse ethylene polymerisation, although on investigation they proved to have no advantages over the established catalysts. Development of these compounds is still continuing in view of the fact that derivatives of radicals other than magnesium can be made, such as aluminium.

Wood Preservative Contains Organotin Compound

A NEW wood preservative containing tributyltin oxide dissolved in a colourless mineral oil has been announced by the Osmose Wood Preserving Co. of Buffalo, New York. The preservative, OZ, can be applied to the wood by brushing, spraying or dipping. It does not affect the colour of the wood and after drying, which takes an hour or two, there is no persistent odour.

It was announced early in 1959 that extensive trials were being carried out by Osmose to test the value of tributyltin oxide as a preservative for wood against standard test fungi cultures.

C.S. Anniversary Meetings at Liverpool University

The anniversary meetings of the Chemical Society will be held at Liverpool University, centred on the Department of Inorganic and Physical Chemistry, from 12 to 14 April and will include symposia on 'Developments in the chemistry of boron and compounds' and 'Some aspects of the chemistry of natural products'. Further information may be obtained from the general secretary, Chemical Society, Burlington House, London W.1.

Foxboro-Yoxall Celebrate 25th Anniversary

To mark the 25th anniversary of their foundation, Foxboro-Yoxall, instrument manufacturers, have issued a booklet which tells something of the history of the company, the processes which go into the manufacture of their various instruments and the services the company supplies for their employees.

New Solartron Instrument Factory at Stage 2

SECOND stage in the erection of the new factory at Chessington, Surrey, for the Solartron Laboratory Instruments Ltd., the electronic instrument manufacturing company of the Solartron Electronic Group, is now under way. The administrative block of 25,000 sq. ft., which at present houses the instrument sales and the international division of Solartron, was occupied early in 1960. Also in this block are the instruments servicing and works training sections, together with some production facilities.

The second section of 50,000 sq. ft. will be completed in October this year and the third stage—a further expansion of 50,000 sq. ft.—will be completed in three years' time. The final factory will be one of the most modern in Britain for the manufacture of electronic instruments and will employ more than 1,000 people.

Fuel Research Station's Work Reviewed

WHEN the Fuel Research Station of the D.S.I.R. closed down in 1959, it was decided to produce a summary of all the work that had been carried out there during its 40 years of existence. This book has now been published by H.M. Stationery Office at 15s.

The book draws together the mass of information contained in hundreds of reports and scientific papers, and is intended to make the information easy of access to future workers in the field of fuel; the investigations at the station have at one time or another covered almost every aspect of fuel problems.

Need For New University of Technology

A new university of technology is required in Britain, said Dr. S. C. Curran, principal of the Royal College of Science and Technology, Glasgow, at a recent dinner in Glasgow. Britain still needed 5,000 places in science and technology to achieve parity with U.S.S.R. and the U.S., even if the Imperial College and the Manchester Institute of Technology—the Royal College's nearest equivalents—carried out expansions as the Royal College had done.

Fungicides Symposium

The Pesticides Group of the Society of Chemical Industry has announced the programme for the symposium on 'Fungicides in Agriculture and Horticulture' to be held on 20 and 21 March. The meeting will be held in the society's rooms at 14 Belgrave Square, London S.W.1, but if a large number of applications are received larger accommodation will be sought. Charges for the symposium will be £1 for members of the Society and £2 10s for non-members. Application forms are available from Dr. B. J. Heywood, Hon. Secretary, Pesticides Group, 103 Harrow Drive, Hornchurch, Essex.

Purer, Stronger Phosphoric Acid from New Five-step Process

AN unusually pure phosphoric acid of 56% phosphorus pentoxide content, as compared with only 28-32% in most acids currently marketed, is produced by a new process that has been developed experimentally in Formosa. This is a modified wet process using solvent extraction with 1-butanol.

The process consists of five steps: (1) reaction of phosphoric acid with phosphate rock to produce triple superphosphate; (2) heating the triple superphosphate with 75% sulphuric acid at 130°C for 5 hr. to produce a mixture of phosphoric acid and calcium sulphate; (3) extracting the phosphoric acid from the mixture with *n*-butanol; (4) separating the *n*-butanol from the phosphoric acid by distillation; and (5) recycling the *n*-butanol and part of the phosphoric acid. The process yields a white anhydrite as a by-product.

A series of experimental studies using three types of phosphate rock and technical grade 85% orthophosphoric acid were described by Mr. Tah-Ho Huang, of the Taiwan Fertilizer Co. Ltd., Formosa, in *Ind. Engg. Chem.*, 1961, **53**, (1), 31. Extraction efficiency varied with temperature, solvent-mixture ratio, number of extractions and the method of filtration.

With 1 ml. of 1-butanol per gramme of mixture, three, four and five successive extractions removed 85, 95 and 99%, respectively, of the total phosphoric acid produced. By continuous countercurrent operation, complete extraction of phosphoric acid can probably be obtained with much lower solvent-mixture ratios.

When 1-butanol is distilled off, the remaining phosphoric acid is stronger and purer than any commercial wet acid before concentration and purification. Also, more than 80% of the fluorine is evolved; thus, the process offers another source of by-product fluorine.

However, Mr. Tah-Ho Huang points out, the process has some disadvantages. The phosphate rock must be finely ground; two separate mixing operations are needed, one for making triple superphosphate and one for sulphuric acid and triple superphosphate digestion; extraction and distillation require heat and solvent make-up. In addition, certain problems such as thermal and material balances, economics, and the stability of 1-butanol, have not been studied.

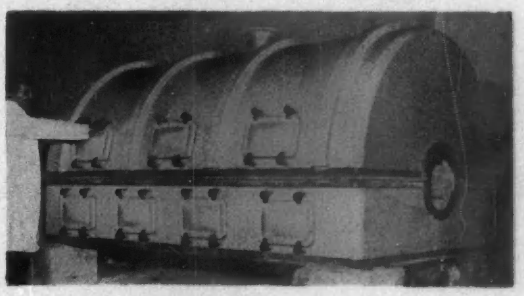
South Africa Makes New Uranium Agreements with U.K. and U.S.

AGREEMENTS have been entered into by South African Atomic Energy Board separately with the U.K. Atomic Energy Authority and the U.S. Atomic Energy Commission concerning a number of aspects of the South African uranium production programme.

These new agreements, which will operate from 1 January 1961, take the place of the present arrangements between the Board and the Combined Development Agency (the Authority and the Commission are constituent partners of the Agency), which provide for the acquisition by the Agency during the six year period 1961 to 1966, of 28,350 tons of uranium oxide equivalent to an average rate of 4,725 tons/year at prices varying as between individual producers and calculated on an incentive cost type formula. In terms of the new agreements the total quantity of material to be acquired by the Commission and the Authority remains unchanged but a reduced rate of delivery to the Authority in the U.K. during the period 1 January 1967 to 31 December 1970, while the average combined rate of delivery to the Commission and the Authority during the six year period ending 31 December 1966 will be reduced from 4,725 tons to 3,733 tons.

Agreement has also been reached on a fixed price for the total tonnage to be acquired by the Commission and the Authority. As part of the new price arrangements the agreement provide for the transfer to South African uranium producers of the ownership of Calcined Products (Pty.) Ltd., who have been responsible for the processing of the material prior to its shipment.

Fibreglass Reinforces Vapour Canopy



Fibreglass reinforced polyester resin vapour canopy for covering rotating machinery in the course of manufacture for Richard Simons and Sons Ltd., Nottingham, by Resinform Ltd., Manchester. An internal vacuum ensures that corrosive vapours are kept inside the cover

Developments in Fuel Cells

Kellogg Sodium-Oxygen Fuel Cell Said to Outpower Hydrogen

DETAILS of a new type of fuel cell, which is the basis of a contract for a chemical power plant awarded to M. W. Kellogg Co., New York, by the U.S. Navy (see CHEMICAL AGE, 7 January, p. 16), have been released.

The fuel cell operates on a mercury amalgam of sodium, oxygen and water and develops twice the voltage of hydrogen cells. The basic reaction is the combination of sodium, oxygen and water to form sodium hydroxide. This reaction has long been of interest for its high cell voltage made possible by the high position of sodium in the electromotive series, but its direct application is complicated by the great reactivity of sodium. An attempt to use a pure sodium electrode in an aqueous electrolyte would obviously lead to an explosive reaction. However, it was found that a dilute solution of sodium in mercury made a useful sodium electrolyte. The direct reaction of sodium in water is suppressed in the amalgam while the sodium is made available for electrochemical use.

A dilute sodium amalgam is supplied to the cell, forming a thin flowing film on the surface of a steel plate. This film forms the anode of the cell. A portion of sodium is stripped from the film and the depleted amalgam falls to the bottom and is removed.

Hollow Cathode

Oxygen gas is supplied to a hollow cathode, one surface of which is a specially formed porous plate of sintered metal or carbon. The electrolyte is an aqueous solution of sodium hydroxide.

The formation of sodium ions at the amalgam anode causes the release of electrons which travel through the external circuit to the cathode where they react with the oxygen supplied and water to give hydroxyl ions. In the electrolyte the sodium and hydroxyl ions form an ionic solution of sodium hydroxide.

As the process continues, electrical energy is generated through the external surface, sodium and oxygen are consumed and caustic is generated in the electrolyte, which becomes increasingly concentrated.

Among the most successful cell designs developed by Kellogg is a concentric tube arrangement in which a cylindrical anode is placed within a cylindrical cathode, with a small radial gap for electrolyte.

The cell reaction is a true electrochemical reaction, since the passage of electric current is required to make the reaction proceed. If the circuit is broken, the consumption of chemicals ceases. In this open circuit condition, a potential of approximately two volts appears across the terminals of the cell. This is nearly twice that of the hydrogen-oxygen cell and represents a major advantage of the amalgam battery. As the current is increased, the potential falls by ohmic and electrode losses. These losses can be made small and high currents may be drawn from the cell.

Kellogg's sodium-oxygen cell operates at atmospheric pressure and at temperatures in the range of 140°F, and has the advantage over the hydrogen-cell of greatly decreased plant volume. The prototype will develop about 75 kW and, together with fuel storage space, will be about 15 times lighter than the standard electric batteries now in use.

Record U.K. Output of Man-made Fibres

PRODUCTION of man-made fibres in 1960 rose 15% to reach the record total of 591.99 million lb. according to the British Man-made Fibres Federation. Production was 513.89 million lb., and compared with 421.51 million lb. in 1958, and 495.14 million in 1957.

U.K. output both of filament yarn and staple fibre were also records, continuous filament totalling 268.61 million in 1960 (234.83 million lb. in 1959), while staple production in 1960 totalled 323.38 million lb. (279.06 million lb.). While nylon, Terylene, acetate and the acrylic fibres all contributed to the expansion, viscose rayon production continued to dominate the position, filament and staple together accounting for about 75% of total production.

Major Research Effort Seeks to Advance Electrochemical Fuel-cell Technology

A FIVE-YEAR, major research effort to advance fuel-cell technology and to bring the device nearer to practical reality has been launched by the Battelle Memorial Institute, Columbus, Ohio.

The long-term programme, which is being underwritten by some 25 major U.S. and European industrial companies, including those in the chemical and petroleum fields, "will be fundamental in nature and is designed to complement existing government, industrial, and academic studies on fuel cell technology", according to Dr. John McCallum, director of the project at Battelle. Dr. McCallum went on to say that before the fuel cell's full potential can be realised, there will have to be a number of inventions, innovations, and breakthroughs.

Much of Battelle's research on the fuel cell will be aimed at obtaining a better understanding of the properties of materials required in a cell and developing materials which approach the ideal.

One approach to improved materials for the fuel cell that the researchers will use is to study the internal electronic structure of alloys. From this study, scientists hope they will be able to develop an alloy composition with unique electrical and electrochemical properties for cell electrodes.

Another approach to be employed is the study of thin films of metals. Thickness of such films greatly affects their properties. A better knowledge of these properties may be a significant factor in the selection of the right combination of materials for more efficient fuel cells.

Other phases of the research programme will include study of active carbon electrodes with metal chelate surfaces and the use of unusual plating techniques to apply porous metal surfaces to electroformed electrodes for the cell. Concurrent with experimental work, new data on fuel cells will be collected and interpreted for the use of participating companies.

Aerosol Manufacturers' Association Formed

A NEW association, to be known as the British Aerosol Manufacturers' Association has been formed. It will be affiliated to the Association of British Chemical Manufacturers, with headquarters at Cecil Chambers, 86 Strand, London W.C.2. Secretary is Mr. W. A. Williams, M.B.E., B.Sc. Names of officers and members are not at present available.

In 1960, U.K. aerosol production amounted to some 25 million units.

More TEL Produced

U.K. production of tetraethyl lead in November totalled 3,419 tons. Output for the first 11 months of last year was 24,262 tons, compared with 21,375 in the same period of 1959.

Supplement to A.B.C.M. Directory

A supplement to *British Chemicals and Their Manufacturers*, the directory of the Association of British Chemical Manufacturers, 86 Strand, London W.C.2, has now been published. The directory, published every two years, last appeared in 1959 and the supplement takes note of the many changes and additions in the list of producers, products and trade names that have since taken place.

Fall in U.K. Copper Sulphate Output

November output of copper sulphate totalled 2,711 tons, making 26,358 tons for the period January-November 1960, compared with 29,521 tons for the same period of 1959.

Overseas News

U.S. OUTPUT OF BROMINE AND SODA ASH WAS HIGHER LAST YEAR

ACCORDING to preliminary estimates by the U.S. Bureau of Mines, production of calcium chloride, calcium magnesium chloride and iodine have decreased during 1960. Estimated U.S. output of calcium chloride and calcium magnesium chloride in 1960 was 3% less in tonnage and 2% less in value than in 1959. Domestic iodine production showed an even greater decrease, amounting to 8%, compared with 1959. Consumption of crude iodine was expected to decrease somewhat from the 1959 level of 1,664,000 lb.

Production capacity of bromine, however, increased, in spite of a decrease in sales. The preliminary sales figure for bromine for 1960 is 177 million lb. a decrease of approximately 18½ million lb. compared with 1959 sales.

The picture is a different one for U.S. sodium and sodium compounds in 1960. Production of soda ash and salt cake continued their upward swing. Preliminary figures indicate a total production of soda ash from natural sources of 811,000 short tons, compared with 735,000 short tons in 1959. Production of natural salt cake in 1960 was estimated at 428,000 short tons (403,000 short tons in 1959).

Argentina Approves Overseas Chemical Plant Schemes

The Argentine Ministry of Trade has approved a number of projects planned by non-Argentine interests for the country's petrochemical industry. The projects in question concern a plant for the processing of natural gas to synthetic rubber and other products to be built at a cost of U.S.$70 million by a North American group made up of Continental Oil Co., Cities Service Co., U.S. Rubber Co., Fish International Corp. and Witco Chemical Co., a unit for the annual production of 13,000 tonnes of carbon black to be erected at a cost of $3,900,000 by the Cabot Corporation and the £5,760,000 I.C.I. polythene plant, details of which have already been released. The Texas Butadiene concern, which formerly planned a plant at Puerto Deseado in the southern Argentine, has abandoned the plan and the Cabot carbon black project was presented to the Government in its place.

3.3 M. Tons/Year Oil Refinery for France

The Société de la Raffinerie de Strasbourg will build a 3.3 million tons/year refinery in the Strasbourg region of France. Scheduled to begin operating in early 1963, it will be supplied with crude from the Mediterranean through the pipeline to be laid soon.

Capital will be supplied equally by three groups—Compagnie Française des Petroles, Compagnie Française de Raffinage, the Antar-Pechelbronn group and the French subsidiary of the British Petroeum Company, Française des Petroles B.P. The refinery is expected to require an investment of N.F.250 million to 300 million.

The Cie Française des Petroles group will take 47% of production, B.P. 39% and Antar-Pechelbronn 14%.

Alginate Industry Planned for Tasmania

Plans to establish a £A400,000 alginate extraction plant in south Tasmania have been outlined in Hobart by the Algin Co. of Australia Pty. Ltd. A survey is to be made of the seaweed beds and the company hopes to supply most of the alginate for the Australian market. It should also become a valuable Australian export.

Knapsack Plan Big Plant for Electrolytic Chlorine

Knapsack-Griesheim AG, Knapsack, West Germany, a subsidiary of Farbwerke Hoechst AG, Frankfurt, plan to build a new chemical plant in the Hürth suburb of Knapsack on a site adjoining that of the existing works, and double its area. First plant to be erected on the new site will be a electrolysis unit, to be built in co-operation with the associate concern Friedrich Uhde GmbH, Dortmund, at a cost of some DM20 million. Building will start this summer.

The company is this year to start processing of ethylene to acetaldehyde and is also planning developments in its oxygen programme, in the petrochemical field and for its Griesheim plant. Of the estimated 1960 company turnover of DM420 million, some DM342 million came from the Knapsack plant.

Soviet Synthesis of Phosphorus-containing Polymers

For the first time, according to a Soviet report, cyclic phosphinites have been synthesised and the reaction of Arbuzov has been applied for their polymerisation to polyphosphonates. Cyclic phenylphosphinites were obtained from the reaction of phenyldichlorophosphine with 1, 3-glycol in the presence of triethylamine. They are colourless mobile liquids, distillable in vacuum and soluble in the usual organic solvents, but insoluble in water. They are readily oxidable to phosphonates by nitrogen oxides. Heating cyclic phosphinites with methyl iodide (0.001-0.1 mole per 1 mole of phosphinite) in sealed tubes in a nitrogen atmosphere results in their polymerisation to polyphosphonates. The reaction, known as the Arbuzov reaction, consists of a multiple repetition of alkylation and rearrangement. The polymers have a molecular weight of 270-3,200 and a softening temperature of 60 to 70°C. They were identified as phosphonates by decomposition with phosphorus pentachloride.

1960 Swings in Italian Chemical Output

The first 10 months of 1960 showed a further increase in the output of Italian industries and the chemical industry in particular. The increase over the same period for the previous year in the chemical industry was 16.9% (16.3% for industry as a whole).

This increase was not uniform throughout the chemical industry. Some products showed a decrease, such as tanning extracts while others remained unchanged (sulphuric acid, sodium carbonate, calcium carbide and tartaric acid). These, however, were more than offset by such products as synthesis ammonia, caustic soda, synthetic organic dyestuffs and especially synthetic resins.

Pakistan Fertiliser Project Makes Progress

A unit of the new 117,000 tons/year urea factory at Fenchuganj, near Sylhet in East Pakistan, was officially inaugurated recently. The factory, which is being built by the Pakistan Industrial Development Corporation with the co-operation of Japan and other foreign countries, is due to go into production in November.

Oil-Fertiliser Agreement between Egypt and Italy

The Italian oil company, E.N.I., have concluded an agreement for the purchase of about 1.5 million tons of Egyptian crude oil in exchange for nitrogenous fertilisers. The fertilisers will be produced by A.N.I.C., Ravenna.

The agreement covers the period from 1961 to 1963 and provides for the exchange of commodities to the value of $24 million. The Italian signatories were A.G.I.P. and A.N.I.C., while the Egyptian Agricultural Board, the General Petroleum Company and the Compagnie Orientale des Petroles d'Egypt signed for Egypt.

New Plants Due on Stream in Rumania This Year

According to the Rumanian Chamber of Commerce, output in a number of sections of the chemical industry will increase in 1961: production of soda ash and caustic soda will be up by 37%; chemical fertilisers 30%; cellulose and semi-cellulose approximately 30%; and the output of synthetic fibres and yarns will be 1,700 tons.

New plants will be commissioned in the industry: the combine at Roznoz with a capacity of 100,000 tonnes of ammonia a year, 210,000 tonnes of nitrogen fertilisers and 10,000 tonnes of urea; the fibres factory at Savinesti with a capacity of

5,000 tonnes; 18,000 tonnes of phenol and 11,000 tonnes of acetone at the Borzesti combine; the Noavodari works will raise their capacity of sulphuric acid by 10,000 tonnes and of superphosphate by 300,000 tonnes and the works of Ocna Muresului will produce 300,000 tonnes of sodium carbonate a year.

French TEL Producer's Have TML Project

Société de Produits Chimiques Ethyl Kuhlmann, joint subsidiary of the Associated Ethyl Co. Ltd., London, and Ets. Kuhlmann, Paris, are to take up production of tetramethyl lead. The company are the only French producers of tetraethyl lead. Bromine output at the Port-de-Bouc plant is to be expanded.

As mentioned in CHEMICAL AGE, 27 August 1960, p. 314, Associated Ethyl, who are at present only able to supply imported tetramethyl lead to U.K. users, have plans to make the product available from U.K. sources.

U.S. Benzine Expansions

Two U.S. companies are constructing or planning extensions to their petrochemical facilities. Shell Oil Co. are completing an expansion programme at their Houston and Woodriver refineries which will increase their benzene capacity to 60 million gall. per year. Benzene capacity at beginning of 1960 was 18 million gall. per year. Pure Oil Co. and Atlantic Refining Co. have announced joint plans to construct benzene, toluene and xylene capacities. The plant, to be constructed at Pure's Texas refinery, will have a capacity of 50 million gall. per year.

Du Pont's Short-lived Polythene Price Rise

Within three days of raising the price of their low-density polythene by 2½ cents/lb. to 30 cents/lb. for truckload quantities, Du Pont had cancelled out the increase. Other U.S. producers did not follow suit and Union Carbide Plastics had stated they would not raise their prices. Reason given for Du Pont's reversal was to meet competition.

Italian-built Acid Plant for Spain

The Spanish chemical producing concern, La Compania Abonos de Sévilla, has entrusted to the Italian company Ansaldo the construction of a nitric acid plant which will have a capacity to produce 225 tonnes/day. Montecatini will collaborate with Ansaldo and will provide technical data.

Polymerising Isoprenes with Organomagnesium Compounds

The polymerisation of a diene hydrocarbon by organomagnesium compounds has been achieved at the Institute of Macromolecular Compounds of the Academy of Sciences, U.S.S.R. Ether-free compounds of the RMgX and R_2X type were shown to induce the polymerisation of isoprene at 80° to 90°C.

Polyisoprenes obtained in this way have a reduced degree of unsaturation and are completely soluble in benzene; they contain 95 to 98% 3,4-links and have a vitrification temperature of −3° to −12°C. The nature of the halogen and organic radical in the organomagnesium compound does not affect the microstructure of the polymer chain. The complex-forming agents diethyl ether and triethylamine reduce both the polymerisation rate and the 3,4-link content.

Hungary Designs Bio-gas Plant for India

Two large-scale experimental bio-gas generating plants for the Indian Government, first mentioned in CHEMICAL AGE, 25 June 1960, p. 1069, are to be constructed at New Delhi under Hungarian supervision. The two plants will have a combined capacity to produce 1,200 cu. m. of gas. The bio-gas will be produced in metal tanks from sugar begasse and in concrete tanks from cow manure and other agricultural waste.

The plants were designed in the Hungarian Design Office for Civil Engineering.

S.B.A. Get Orders for Styrene Plant in France

The Liege, Belgium, chemical producers Société Belge de l'Azote et des Produits Chimiques du Marly (S.B.A.) have received an order from the French concern Aethyl-Synthèse to build a plant at Lillebonne for the annual production of 25,000-30,000 tonnes of styrene. The unit will work to the Koppers Co. system. S.B.A. have already built one styrene unit for Aethyl-Synthèse, at Mazingarbe.

Finland's Sodium Sulphate and Calcium Chloride Project

The State sulphuric acid and superphosphate enterprise in Finland will build a new plant with a production capacity of 70,000 tons of sodium sulphate and 62,000 tons of calcium chloride. These will be produced from the new Pyhäsalmi mine's production of iron, copper and zinc. The sodium sulphate will be used by the cellulose industry and the calcium chloride is needed as a binding agent for dirt roads.

£9 M. Refinery for Ghana

An agreement under which a £9 million oil refinery will be built in Ghana was signed on 21 January between the Government of Ghana and the Italian State-owned concern E.N.I.-A.G.I.P. Construction will be by A.G.I.P. through a new Ghana-based company, Ghana Italian Petrol. Under the agreement, the Government of Ghana will acquire a half share in the refinery 10 years after production begins.

Liquid Methane Storage in France

Gaz de France are reported to have set up an experimental plant near Nantes for the storage of liquefied methane. The cylindrical reservoir which has been built can hold up to 500 cu. metres of liquefied methane, which, upon being regasified, could supply local requirements with up to 50,000 cu. m. of gas a day. Underground caves in the vicinity are also being prepared for storage of liquefied methane.

Joint Production of Organic Fertilisers in Sicily

Ente per la Riforma Agraria in Sicilia and Societa' Finanziaria Siciliana are to set up a joint company which will build an organic fertilisers plant in Sicily.

U.S. Atomic Reactor Explosion was 'Nuclear'

The U.S. Atomic Energy Commission has confirmed that the nuclear reactor explosion at Idaho Falls which killed three men (C.A., 14 Jan., p. 102) was due to a nuclear reaction and not to chemical causes. Cause of the accident will not be known for some time, when the investigating committee makes its report.

Soviet Synthesis of High-molecular Polyamides by Polycondensation

POLYAMIDES with aromatic rings in the polymer chain have a high heat resistance and are insoluble in conventional solvents. Synthesis of most aromatic polyamides in melts is impossible owing to their high melting point. The Scientific Research Institute of Synthetic Resins, U.S.S.R., made a study to determine the conditions in which interfacial polycondensation of aromatic diamines with aromatic dicarbonic, acid chlorides would provide polymers with a maximum molecular weight.

Theoretical analysis of the interfacial polycondensation process of the initial substances showed that aromatic polyamides with a maximum molecular weight would be obtained in an acid medium when acids rather than acceptors of hydrogen chloride were added to the aqueous phase. This was confirmed by experimental study of interfacial polycondensation of aromatic polyamides with terephthalic acid chloride in the presence of a number of acids in a wide range of pH values. It was shown that the initial pH of the aqueous phase must be below 7.

Although polycondensation in acid media reduces the yield of the polymer, the yield can be increased by the proper selection of test conditions such as temperature and reactant concentration. The separation of HCl during the polycondensation process was shown to modify the pH of the aqueous phase. It is assumed that maintenance of a constant pH—which was not done during the tests—would increase both the molecular weight and the yield of the polymer.

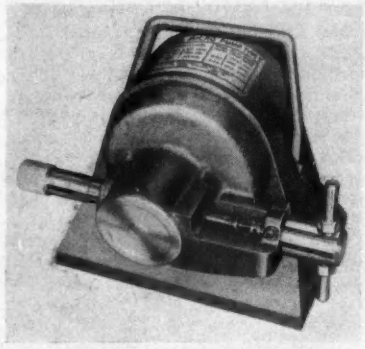
EQUIPMENT NEWS

Chemical Plant : Laboratory Equipment: Control and Indicating Apparatus

NEW D.C.L. METERING PUMP

THE range of D.C.L. Metering Pumps is being further extended by the addition of the type 'S' micro pump. The pump is available from **The Distillers Co. Ltd.**, Great Burgh, Epsom, Surrey, in a range of capacities—the smallest from 0 to 100 ccs./hr., the largest from 0 to 1,500 ccs./hr.—controlled by micrometer adjustment. The standard plunger heads are constructed in 18/8/3 stainless steel. Diaphragm heads in a wide range of materials are also available.

The synchronous motor is arranged, for safety, to operate from a 25/30 volt



D.C.L. 'S' micro pump

supply; where such a supply is not available a small portable plug-in type transformer is available, enabling the equipment to be used from any normal A.C. voltage. The Nelson hetrapolar motor is gearless and two speeds are available.

The motor assembly for the single and duplex pumps is identical and the Simplex pump can be used either with one head or, by the addition of a second pumping head, can be converted into a duplex pump. The heads, which operate 180° out of phase, improve flow characteristics if they are coupled in parallel. Alternatively, the two heads of the duplex pump can be used independently, both being controlled for output by micrometer adjustment.

Price of the standard 'S' micro pump with plunger head is £75 and the plug-in transformer with 8 ft. of lead, £4 10s 0d. At present the pumps are available in standard materials from stock.

HIGH-PRECISION LABORATORY FURNACES

PRECISION laboratory furnaces which are claimed to have a stability of temperature of ±0.25°C and incorporate an interchangeable drum control for thermal cycling, and facilities for heat loss compensation at the ends of the tube, have just been introduced by **Shandon Scientific Co. Ltd.**, 6 Cromwell Place, London S.W.7. In the standard range there are three models for maximum temperatures of 1,050°C with tube sizes respectively of 35 mm. i.d. × 290 mm. length (for operation on 115 volts A.C.), 60 mm. × 450 mm. (220 volts A.C.) and 75 mm. × 700 mm. (220 volts A.C.); and two models for maximum temperatures of 1,250°C, with tube sizes of 35 mm. × 290 mm. (115 volts A.C.) and 60 mm. × 450 mm. (220 volts A.C.). Two special models for maximum temperatures of 1,500°C are also available, with tube sizes of 16 mm. × 250 mm. (115 volts A.C.) and 35 mm. × 400 mm. (220 volts A.C.).

The standard models may be controlled either by a thermostatic regulator or a chronograph drum control for thermal cycling, these temperature-control arrangements being easily interchangeable by the user. Prices of these laboratory furnace units are from £95.

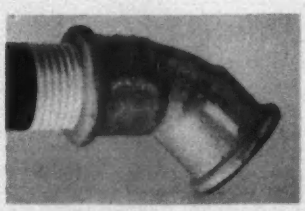
SUB-MICRON PROCESS FILTER

A PROCESS filter for filtering sub-micron particles from liquids is manufactured by the **Gelman Instrument Co.** of Chelsea, Michigan, U.S. The unit is based on the use of a porous plastic sheet with uniform sub-micron holes in it, which acts as a sieve to trap all particles of 0.1 micron and above. This 'membrane filter' is housed in a metal container-support assembly and supported by a sintered stainless steel plate. The membrane filter portion is disposable. The filter holder is available in three different models for pressures of 50, 100 and 500 p.s.i. and in stainless steel or nickel plated bronze.

P.T.F.E. TAPE SEALS PIPE CONNECTIONS

AVAILABLE in rolls ½ in. wide and some 520 in. long, Hilflon unsintered p.t.f.e. tape provides a handy sealant for threaded connections of pipes and tubes in plastics, metal or ceramics. Being a compressible solid, the tape moulds itself to all threaded materials whether large or small in diameter or section. Resistant to most known chemicals and unaffected by weathering or ageing, it is clean and easy to apply and also easy to store, dispense and transport.

Having a coefficient of friction lower than graphite or molybdenum, Hilflon possesses a unique anti-seizing property so that joints can be easily broken after very long periods of time. This self-lubricating quality also means that connections can be drawn up very tightly and pressures in the order of several thousand p.s.i. can be easily accommodated. Suppliers are **William Rose Ltd.**, Hilyn Works, Lockfield Avenue, Brimsdown, Middlesex.

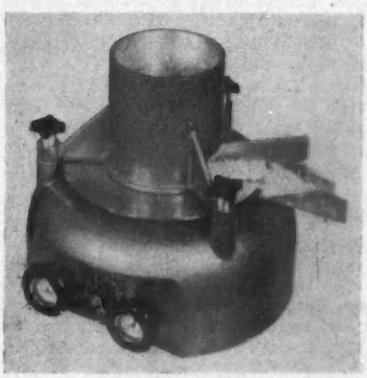


Hilflon p.t.f.e. sealing tape applied to a threaded pipe connection

FEEDING AND DOSING UNIT

INTRODUCED by the makers as "an entirely new means of providing stable feed rates and repeatable doses of granular, sludge, powdered and similar materials to close tolerances," the Watson-Marlow CRF/J constant rate feeder comprises basically a table rotating beneath a fixed hopper throat which has an aperture in its base. Hinged on one side of the aperture is a blade which projects through it towards the centre of the table and out beyond its perimeter.

The material falls down the hopper throat to rest on the central portion of the table. Rotation of the table causes a section of the material to travel along the blade, through the aperture and out



Marlow CRF/J constant rate feeder

over the table edge, whence it is collected by a chute. At the same time the internal friction of the material in the hopper throat induces a spiral stirring action which keeps it moving down to the table face.

In travelling along the blade, the material being dispensed is acted upon by two opposed forces; one outwards towards the table perimeter and the other transverse to it against the face of the blade. There is a continuous inverse variation in these forces as the material progresses and a balance, which is self-compensating for irregularities of emergence from the aperture, is reached at the table edge.

Delivery rate is coarse controlled by the angular setting of the blade, which governs the size of the throat aperture, and fine controlled by the speed of the table rotation. This is infinitely variable over a range of 9:1, generally between 10 and 90 r.p.m.

Feeds ranging from a few grains per

minute of fine materials up to a ton an hour of heavy materials are obtainable on the one unit. Both controls incorporate indicators so that exact settings can be made and repeated at will. Delivery rates vary almost linearly with the table speed and once calibrated for a given material, settings can be read from a simple graph to provide any nominated rate. An adjustable timer stops the table at the end of the desired period and this enables doses of any required volume and hence weight to be made.

Examples of materials handled, cited by the makers, the **Watson-Marlow Air Pump Co.**, Marlow, Bucks, include wet and dry sands, polythene chips (¼ in. cubes), chocolate paste, fine photographic powders, coal dust, manganese ores and sugar.

NEW AMPLIFIER FOR ALTOFLUX FLOWMETER

A NEW amplifier for use with the Altoflux flowmeter has recently been introduced by **Alto Instruments (Great Britain) Ltd.**, Bath Road, Stroud, Glos. Known as the Veriflux amplifier, the new unit has the facility to feed the output directly into any proprietary secondary instrument such as potentiometric and deflection types or electronic transducers. There are two outputs of 0-15 mA. and 0-50 mV. Printed circuit construction is used throughout.

An indicating milliameter to facilitate setting-up and check-calibration is incorporated. The standard amplifier is suitable for three flow ranges (the range switch being visible) and the instrument is completely interchangeable with the present Altoflux amplifier.

BATCH DRYING STOVES

A RANGE of batch drying stoves manufactured by **Chemical Equipment Engineering Ltd.**, of Macclesfield, Cheshire, has many features as a standard fitting which the makers claim are not usually so on this type of equipment. They are designed to take easily-manipulated tray trucks, usually fitted with detachable drying trays which can be filled with wet material at any point in the factory. The loaded truck is wheeled by hand and inserted into the drying stove.

These stoves are planned for heating by either steam, electricity or gas. The hot air is circulated by large volume axial flow fans fitted inside the stove and specially designed to allow low air transfer velocities across the surface of the material being dried, which avoids powder carry-over into the ducting. The fans run in specially designed bearings which are placed outside the heated zone. This avoids overheating and seizing up of the bearings through inadequate or incorrect lubrication. An easy method of fan speed variation is provided and the electric motor mounting plate is hinged to give a simple but effective belt adjuster.

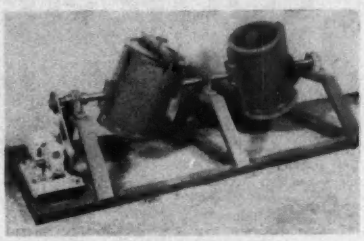
Insulation is achieved with glass wool approximately 1 in. thick fitted inside fabricated steel panels, and greater thicknesses are available for higher operating temperatures. Easy facilities are provided for variation of the percentage of air recirculated, from 0-100%, in order to allow the operator to determine optimum drying conditions for any material and for any particular condition of atmospheric humidity.

For speed and ease in charging the stoves the doors are each fitted with a single handle which operates a top and bottom bolt similar to a van rear-door which the operator can close and open with one hand.

For corrosive installations these stoves can be constructed without any steel parts in contact with the drying gases by using a homogeneously pressed asbestos compound of 1 in. or greater thickness which is sufficiently rigid and non-breakable to be used without any protective metal outer-cover, and requires no painting. Special scrubbing outlet ductings can be provided for materials which become dusty as they dry, and wet scrubbers for other materials which 'sublime'.

Stoves can be built either in single units to take one truck or in units to take two, three or four trucks to which can be added other units to form a battery.

MECHANICAL PAINT STIRRER



Creating a 'stirring example' is this mechanical mixing set-up at the works of a London engineering company, James H. Randall and Sons Ltd., 4 North Wharf Road, London W.2. Specification demanding the use of a heavy-bodied paint meant that one of their customers had to spend 20 min. stirring each can of paint—a wrist-breaking and costly job. So Randall built a mechanical mixer that does the job in a few minutes. The unit consists of two 5 gall. drums angularly mounted on one shaft. This shaft is rotated by a ½ h.p. electric motor through a 66 to 1 reduction gearbox and pulley drive at a speed of 30 r.p.m. The resulting action swills and churns the paint rather than throwing it against the drum walls as would happen if the drum was rotated about its own axis.

VERSATILE PULSE POLAROGRAPH

THE A1655 pulse polarograph, developed at the A.E.R.E., Harwell, to overcome the limitations of square wave polarography when applied to irreversible reductions, is claimed to have the marked advantage of operating satisfactorily with base electrolytes 100 times more dilute. The instrument is capable of producing both normal and derivative polarograms, it being possible to detect reversibly and irreversibly reduced ions at concentrations at 10^{-6} and 10^{-7} respectively. Effects due to residual current, and to high concentrations of ions reducing at a lower potential, have been largely eliminated.

Manufactured by **Southern Instruments Ltd.**, Frimley Road, Camberley, Surrey, the pulse polarograph is in console form with 12-in. eye-level chart recorder, thermostatically controlled electrode system and self-contained hydrogen generator for deoxygenation.

FIBRE DRUMS FOR LIQUIDS AND SOLIDS

Two new fibre drums, one for liquid packaging and the other for dry or near-dry goods, have been introduced by **Venesta Plywood Ltd.**, Vintry House, Queen Street Place, London E.C.4. Both feature a new method of seaming the metal ends to the fibre body wall without riveting or stitching—avoiding interior projections which, under rough handling, might catch and tear the internal liner. Base and lid are made from heavy-gauge steel, finished with a stoved-on epoxide lacquer.

For liquid packaging, a 5-gall. drum is the first to be introduced; other sizes may be added to the range later. The

New Venesta drums for liquids

standard liner for the 5-gall. pattern is made from seamless, layflat polythene tubing to which circular discs of film are welded to form the liner ends. An injection-moulded polyvinyl chloride plastics neck is welded into the top of the liner and secured to the steel lid by a threaded p.v.c. collar. Alternative liners for use where different physical characteristics and compatabilities are required are available in p.v.c. film or latex.

For dry products, three types of fibre body are available providing different degrees of moisture protection. Basically, the tube is wound from chipboard and kraft; this can be reinforced with aluminium foil in various ways or the kraft can be combined with polythene film. Standard internal diameters for the dry-product drums are 14½ in., 12 in. and 10 in., with bodies of any length up to 38 in.

ELECTRICITY CONSUMPTION CONTROL

AN excess demand warning system, which provides a close degree of control over the consumption of electrical energy, has been introduced by **Ferranti Ltd.**, Hollinwood, Lancs. The system maintains a continuous watch over the energy consumed during each successive demand period and compares it with an ideal load set by the user. The difference between the actual load and the ideal load is displayed on a 6 in. dial indicator and when

the energy consumed by the actual load exceeds that of the ideal load by a predetermined amount a pair or pairs of alarm contacts close.

The discrepancy indicator is a ratiometer type instrument arranged so that the pointer remains on zero when the integrated loads are equal, moves to the left when the actual load is below the ideal load and moves to the right when the actual load kwh. or Mwh. exceeds the ideal load set by the user. The state of the ideal/actual energy consumed can be seen on the discrepancy indicator at any time during each demand period. Hence, depending on the time of viewing and the relevant load conditions, arrangements can be made to shed a percentage of the load.

Although this equipment is intended for giving warning of excess demand, it can quite easily be adapted for load control purposes, where it is desired to maintain the load steady within close limits set by the user.

AUTOMATIC FILLING MACHINE

THE Filamatic fully-automatic machine is designed to dispense pre-measured quantities of liquid, automatically and continuously, at a uniform selected speed. It is claimed to provide an accuracy of better than 1%, and has applications in industry for filling vials, ampoules, bottles, tubes, etc., and for metering small quantities of liquids in production processes. It may also be used for laboratory work—e.g. for dispensing reagents in series tests.

The machine may be fitted with interchangeable glass or stainless steel syringes of 1, 3, 5, 10, 20, 30 or 50 ml. capacity, and special large models are available up to 1,040 ml. capacity. It will handle any free-flowing liquid from water-thin solutions to light oils, polyester and epoxy resins, agar gel, etc.

The Filamatic incorporates an electronically controlled, variable-speed drive; the volume of liquid discharged at each stroke is regulated by an eccentric on the crankshaft and is adjustable by a micrometer control. A number of factory-fitted optional extras are available, while accessories which may be fitted after production include a dual-valve attachment, for increased accuracy where this is desirable; a non-drip delivery nozzle; an adaptor enabling Luer-Lok syringes (up to 10 ml.) to be used; an all-glass filter attachment; a foot switch; and a fixed filling-head for attachment to the machine housing.

Prices of the Filamatic range from £125 10s. according to the model; the suppliers are **Shandon Scientific Co. Ltd.**, 6 Cromwell Place, London S.W.7.

REPAIR TO BALL MILL AT CHEMICAL PLANT

A REGRINDING operation on the 33 in. dia. journals of a ball mill at a North of England chemical works has saved weeks of lost production time. The journals have been restored to their original accuracy and surface finish with the mill merely jacked up from its bearings.

When the mill was stripped down for a routine overhaul, it was found that the journals were badly ridged and had worn slightly cone shaped. The normal method of repair would have been to transport the mill to a machine shop where it could be turned in contact with a special cutting tool. As the mill weighs some 10 tons, the problems of both transport and machining would have been considerable and the latter could have involved a risk of irreparable damage to the journals.

Nicol and Andrew Ltd., of 20 Kelvin Avenue, Hillington, Glasgow S.W.2, were called in to examine the mill. They had carried out many such repairs on heavy machinery, from marine engines to colliery winding gear. After inspection of the job, they undertook to carry out resurfacing of the journals provided the ball mill could be jacked up. All plant at this works is running on continuous high production, so it was arranged that portable Master-Hone equipment and operators would travel by road early the next day, so that work could commence within 24 hr.

Repairs to a ball mill in a chemical works: the grinding head in position

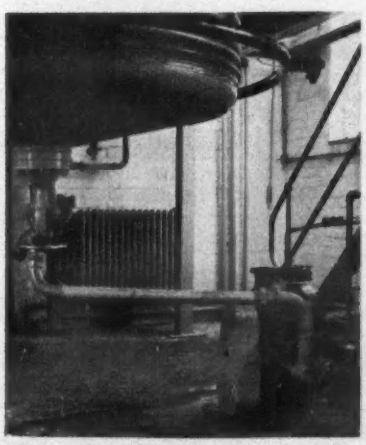
The Master-Hone grinding head consists of a split pulley and frame carrying banks of grinding stones and the driving belt must be adjusted constantly to correct ovality and restore uniformity of diameter along the length of the journal.

Working round the clock, it took three days to true-up each journal against at least twice that period by any other method. The repair was completed to an accuracy of .002 in. with average stock removal of .075 in.

Positive Displacement Pumps Solve P.V.A. Emulsion Handling Problem

INTRODUCTION of three Megator M.16 pumps for handling hot viscous polyvinyl acetate emulsions throughout the production, mixing and packaging stages, has enabled H. A. Smith Ltd., of Braunston, near Rugby (manufacturers of industrial adhesives) to replace their earlier small-batch methods of handling by a semi-continuous system in which the materials are carried and contained in closed pipes and vessels. Under the new system spillage is considerably reduced, an important point since when dried these adhesives are extremely difficult to remove. The factory area can now be maintained in a much cleaner condition and the new system has also resulted in a smoother flow of production.

The polymerisation process is carried out in batches of up to 400 gall. and on completion the polymer, at a temperature of 90°C and at a fairly high viscosity, passes out of the base of the reaction vessel to a Megator M16 pump, electric motor driven, which pumps the material through 200 ft. of 2-in. piping, and a total rise of nearly 30 ft. to a storage tank. On a full 400 gall. batch, this pumping operation takes some 45 min. As soon as the batch of polymer has been transferred to the tank, a second Megator M16 pump begins continuous circulation of the hot material through a cooling system, withdrawing polymer from the base of the tank and returning it after passage through the system to the top of the tank. After the full batch has been delivered and its temperature reduced sufficiently, a bypass on the circulating pump is opened and the batch is pumped through flexible hoses to one of several storage tanks on the floor above.



After polymerisation in the reaction vessel (above) the polymer is transferred by the pump through 2-in piping to a storage tank some 200 ft away, through a rise of 30 ft

The material is kept in these tanks until it is required for blending, when it is gravity fed into a mixing vessel, and direct from this vessel, again by gravity, to a drum-filling unit. When the material is being transferred in bulk to a road tanker, however, a third Megator pump is used to fill finished-product storage tanks at ground floor level, and also to pump material from these tanks into the road vehicles.

Supplies of the pumps were **Megator Pumps and Compressors Ltd.**, 43 Berkeley Street, London W.1, according to whom Megator positive displacement pumps were chosen to handle this difficult material at high temperatures because of their absence of fine clearances and their ability to operate efficiently at relatively low speeds, thus avoiding local overheating.

Bookshelf

NEW IMPROVED VOLUME ON GAS CHROMATOGRAPHY SYMPOSIUM

GAS CHROMATOGRAPHY 1960. Edited by *R. P. W. Scott*. Butterworths, London, 1960. Pp. xviii + 466. 95s.

The invention of gas chromatography has transformed the analysis of volatile chemicals. It has made accessible fields of investigation that could not previously be considered. Many applications of the method were obvious and have been rapidly exploited, but only recently have researches been planned to take full advantage of the technique. This volume is the record of the Third Symposium organised at Edinburgh in June, 1960 by the Institute of Petroleum.

The records of the first two Symposia have been very useful to everybody working in the field, particularly because the papers were more up to date than the available monographs. To this end the publishers have made a notable contribution by publishing the third book with a full record of the discussion only six months after the meeting.

It is impossible to review the 30 papers which were divided into three sections: Apparatus and Technique; Theory and Application; and General Applications. Much useful work and many new devices are reported, but there were no revolutionary developments. The time has come when the organisers should consider if there is a real need for further symposium volumes. The papers might be more generally available either in the analytical journals, or, if gas chromatography is used largely as a tool, in the general literature.

The present volume, which will be needed in all laboratories that take gas chromotagraphy seriously is greatly improved by the inclusion of a full subject index. In general the production is excellent, but it would be better if authors' names rather than section headings appeared at the tops of the left-hand pages.

Laboratory Techniques

LABORATORY MANAGEMENT AND TECHNIQUES. By *J. A. Edwards*. Butterworths, London. Pp. 207. 35s.

A well-known manager of a large university chemistry laboratory has drawn deeply on his wide and long experience to compile this very readable book on laboratory management and techniques.

The scope of the book is wide, ranging from a discussion of the planning and design of a new laboratory to a consideration of staff problems such as the recruitment, selection and training of technical staff, the human relations between academic and technical staff and the role of the laboratory manager. Other parts of the book deal with laboratory organisation and maintenance, safety and fire precautions and first aid. Another section entitled 'Purchases and records' is a valuable guide to those responsible for the management of stores, inventories, etc.: there follows a useful chapter on the importation of dutiable scientific apparatus. The remainder of the book, entitled 'Special and auxiliary units', considers the radioactive materials laboratory, the lecture theatre and its equipment and visual aids, photography and the organisation of darkrooms, workshops, and finally the library.

The style of this book is simple, direct and authoritative, and it should be of value not only to laboratory managers but also to many others concerned with laboratories.

Organic Chemistry

ORGANIC CHEMISTRY. By *A. R. Day* and *M. M. Joullié*. D. van Nostrand, Princeton, 1960. Pp. vi + 864. 71s 6d.

This is an introductory text, suitable for an intensive one-year course. Aliphatic, alicyclic, aromatic and heterocyclic compounds, hydroxy derivatives, thiols, ethers, etc., are discussed in turn. This approach, combined with the early introduction of modern theories of structure and reaction mechanism, enables the authors to provide an integrated account of organic chemistry which has much to recommend it. Unfortunately, the book has some blemishes. The number of factual errors is rather large and there are some inadequacies in presentation, e.g. the authors do little to stimulate interest in natural products chemistry. Furthermore, although the book is readable and eminently clear, it is sometimes rather dry; the fact that the personalities of classical organic chemistry are scarcely mentioned is perhaps typical of this.

Perchlorates

PERCHLORATES. Edited by *J. C. Schumacker*. Reinhold, New York; Chapman and Hall, London; 1960. Pp. xii + 257. 70s.

This American Chemical Society Monograph has the sub-title 'Their properties, manufacture and uses'. It was begun in 1942 with assembly of a complete reference file to be used in a research and development programme. The information is presented from the point of view of the manufacturer interested primarily in finding a developing novel, economical and safe methods of manufacture, handling and use. Six authors and the head of a technical information centre largely produced the book. There is a wealth of information and comprehensive indices. The book will be very useful to all specialists in the field.

The general chemical reader will probably feel that the book is old fashioned. Little effort has been made to explain the wealth of facts in terms of the dimensions of the perchlorate ion or other physical terms. The fact that the only recorded value of the heat of formation of anhydrous perchloric acid is that of Berthelot may be an indication of the difficulties that beset the theoretical systematiser.

The use of perchlorates in laboratories, especially those concerned with analysis and ionic equilibria, is rapidly increasing. Fairly large quantities are often required. It is to be hoped that all workers concerned will read the last chapter of this book on safe handling.

Terpene Chemistry

THE CHEMISTRY OF THE TERPENES. By *A. R. Pinder*. Chapman and Hall, London. Pp. 223. 50s.

Main objects of the book are stated to be the provision of the essentials of terpene chemistry for Honours students and the bridging of the gap between the necessarily brief accounts to be found in general textbooks of organic chemistry and the comprehensive volumes which are suitable only for the specialist and research students.

A brief chapter on the essential oils is followed by a chapter on determination of structure in which analytical, physicochemical and chemical methods are summarised and the stereochemical aspects of terpenes discussed. Some 80 pages are devoted to monoterpenes and 30 pages to sesquiterpenes. Di- tri- and tetraterpenes are then considered and the book concludes with a short chapter on rubber and related compounds and another on biogenesis. Useful bibliographies are given at the end of each chapter.

Numerous syntheses are described and flow sheets are clearly arranged. It is in the treatment of degradations that the text is not as full as some teachers may require. For instance, the relation of α-pinene to α-terpineol is not discussed, nor is the oxidative degradation and inter relationship of cadalene and eudalene.

The Wagner-Meerwein and Nametkin rearrangements are also briefly discussed. The statement that the formation of camphene from bornyl chloride and of bornyl chloride from pinene proceed via hybrid carbonium ions is controversial.

Nevertheless, a book of this scope is needed for teaching at the Honours level and it should provide a useful supplement to a lecture course.

PEOPLE in the news

● **Mr. R. O. M. Edenborough** has been appointed managing director of Sterling Drug International Ltd., a U.K. subsidiary of Sterling Drug. Inc., New York. He remains a divisional director of Bayer Products Ltd., with whom he has been associated for more than 30 years.

● **Mr. J. E. C. Bailey, C.B.E.,** managing director of Baird and Tatlock (London) Ltd., Hopkin and Williams Ltd., and W. B. Nicholson (Scientific Instruments) Ltd., is leaving the U.K. on 5 February for a tour of the companies' branches and agents in Africa. Mr. Bailey will be visiting Nairobi, Ndola, Salisbury, Johannesburg, Cape Town and Durban, and will return to the U.K. on 4 March.

● **Mr. T. P. van den Bergh** is on 15 May to succeed **Mr. J. W. Ernste** as director of Shell Nederland Chemische Fabrieken N.V. and of the refining company Shell Raffinaderij N.V. At present Mr. Bergh is on the board of Shell Italiana.

● **Mr. W. H. Coulter,** vice-president of Coulter Electronics Ltd., London, was the recipient at a ceremony in Philadelphia recently, of the John Scott Award, consisting of a copper medal, scroll, and $1,000, presented annually for inventions which are outstanding contributions to science. The invention with which Mr. Coulter is connected is the Coulter counter used in industry as a fine particle measurement instrument and in medicine as a blood cell counter and cell analyser.

● **Mr. G. C. Martin** of the product development department of Monsanto Chemicals Ltd. has gained a London Ph.D. degree. He studied at Imperial College and joined Monsanto last year.

● **Dr. Ronald Britton,** head of the Pharmaceutical Division, and **Mr. Michael Clarke,** company secretary, have been appointed directors of Horlicks Ltd.

● **Mr. Raymond C. Mildner,** former chief technical officer of Telegraph Construction and Maintenance Co. Ltd., Greenwich, has joined the plastics department of the Dow Chemical Co., Midland, Mich. He will be responsible for dielectric research aimed at improved performance of Dow plastic materials in all types of cables.

● **Dr. Norman A. de Bruyne, M.A., Ph.D., F.R.Ae.S.,** formerly managing director of CIBA (A.R.L.) Ltd., is now associated with Techne (Cambridge) Ltd., where he has been working on the development of new instruments, including a new viscometer said to be capable of handling almost any liquid.

● **Dr. P. G. McCarthy** has been appointed a director of the British Titan Products Co. Ltd., 10 Stratton Street, London W.1.

● **Professor Dr. Otto Bayer,** of Leverkusen, **Professor Dr. Walther Reppe,** of Heidelberg, and **Professor Dr. Karl Ziegler,** of Mülheim/Ruhr, three of West Germany's leading chemists, are simultaneously to be awarded with the Siemens Ring. The Ring is awarded only to outstanding scientists and is held by few.

● **Dr. L. A. Allen, D.Sc., Ph.D., D.I.C., F.R.I.C., M.I.Biol.,** until recently in charge of the molasses utilisation department at the Tate and Lyle Research Laboratories, is now in practice as an independent consultant microbiologist and chemist, specialising in research and development work, hygiene, effluents and problems in the food and fermentation industries. Dr. Allen's address is 66 Sutherland Avenue, Petts Wood, Orpington, Kent.

● **Mr. J. R. Bickerton,** chief chemist at the Alma Mills, Hyde, Ches, of Fletcher Miller Ltd., manufacturers of leather oils and dressings, has been appointed to the board.

● **Lord Netherthorpe** has been appointed deputy chairman of the board of Fisons Ltd. Lord Netherthorpe, formerly Sir James Turner, became a director of the company on 1 February, 1960. He was president of the National Farmers' Union for 15 years until the beginning of last year.

Lord Netherthorpe

● **Sir John Wrightson, Bt.,** chairman of Head Wrightson and Co. Ltd., has left by air for India, where he will visit the Durgapur Steelworks, and will call on some principal customers in Calcutta, Jamshedpur, Burnpur, New Delhi and Bombay. He will also be present when the new company, Head Wrightson India Ltd. officially starts operations in Calcutta.

● **Mr. Ian Keith** has been appointed to the board of British Moulded Hose Co. Ltd., a subsidiary of B.T.R. Industries.

● **Mr. Norman Heaton** has been appointed company secretary to all companies within the Pfizer Group. Before this, he successively filled the position of secretary and sales manager of Kemball Bishop and Co. Ltd., a member of the Group.

● **Mr. S. N. Turner,** vice-chairman and deputy managing director of the Staveley Iron and Chemical Co. Ltd. (a subsidiary of Stewarts and Lloyds), is resigning from the board on 31 March to devote more time to his other business connections.

● Coincident with the retirement of **Mr. J. Arthur Reavell** from the chairmanship of the Kestner Group and his appointment as president and the appointment of **Mr. B. N. Reavell** as chairman (C.A., 7 and 14 January), **Mr. G. H. Black** becomes managing director, while **Mr. C. A. Pither,** director and secretary, on the retirement of **Mr. W. S. Knight** after 47 years as director and secretary. **Mr. J. W. Grose** continues as an executive director.

Monsanto Appoint Effluent Expert to New Post of Senior Scientist

THE new position of senior scientist has been created by Monsanto Chemicals Ltd. for one of their technical staff, **Dr. J. S. Wilson, Ph.D.** The appointment is part of a Monsanto scheme under which outstanding scientists on the staff may receive proper recognition of their status while continuing to specialise in scientific or technical work rather than accepting increased administrative responsibility.

In his new capacity, Dr. Wilson—who has gained world recognition as a leading authority in effluent purification—will be free to devote all his time to research on effluent treatment and the microbiological breakdown of organic compounds. He is responsible for Monsanto's technical liaison with Simon-Carves Ltd. in the recently formed Simon-Carves Monsanto Effluent Advisory Service (CHEMICAL AGE, 8 August, p. 235).

Before joining Monsanto's research department in 1934, Dr. Wilson studied under Professor Ingold at Leeds University. He became chemist-in-charge of phthalic anhydride production and in 1947 took charge of all work connected with effluent treatment. In that capacity he was responsible for the design and working of the effluent plant at Monsanto's Ruabon site, which has attracted world-wide interest.

BRITISH CHEMICAL PRICES

GENERAL CHEMICALS

Acetic Acid. 10-ton quantities, 80% tech. in bulk, £77 per ton; in casks, £90 per ton; 80% pure in bulk, £83; in casks, £94; glacial, 98/100% in bulk, £93; in drums, £100.

Acetic Anhydride. Ton lots d/d, £128.

Alum. Ground, f.o.r., about £25.
MANCHESTER: Ground, £25.

Aluminium Sulphate. Ex-works, d/d, £15 10s to £18.
MANCHESTER: £16 to £18.

Ammonia, Anhydrous. Per lb., 1s 9d-2s 3d.

Ammonium Chloride. Per ton lot, in non-ret. pack, £33 2s 6d.

Ammonium Nitrate. D/d, 4-ton lots, £37 10s.

Ammonium Persulphate. Per cwt., in 1-cwt. lots, d/d, £6 13s 6d; per ton, in min. 1-ton lots, d/d, £123 10s.

Ammonium Phosphate. MAP., £106 per ton; DAP, £100 10s., per ton, d/d.

Antimony Sulphide. Per lb., d/d UK in min. 1-ton lots; crimson, 5s 7d d/d to 6s 1d; golden, 3s 10d d/d per lb. to 5s 3d d/d.

Arsenic. Ex-store, £45 to £50.

Barium Carbonate. Precip., d/d, 4-ton lots or more, bag packing, £41 per ton.

Barium Chloride. 2-ton lots, £45.

Barium Sulphate [Dry Blanc Fixe]. Precip. 2-ton lots, d/d, £39.

Bleaching Powder. Ret. casks, c.p. station, in 4-ton lots. £30 7s 6d.

Borax. Ton lots, in hessian bags, c.p. Tech. anhydrous, £60 gran., £47 10s; crystal, £51; powder, £52; extra fine powder, £53; BP, gran, £56 10s; crystal, £59; powder, £61; extra fine powder, £60. In 6-ply paper bags, per ton, £59.

Boric Acid. Ton lots, in hessian sacks, c.p. Comm., gran., £78; crystal, £87; powder, £84 10s; extra fine powder, £86 10s; BP gran., £91; crystal, £99; powder, £96 10s; extra fine powder, £98 10s. Most grades in 6-ply paper bags, £1 less.

Calcium Chloride. Ton lots, in non-ret. pack; solid and flake, about £15.

Chlorine, Liquid. In ret. 16-17 cwt. drums d/d in 3-drum lots, £41.

Chromic Acid. Less 2½%, d/d UK, in 1-ton lots, per lb., 2s 2¼d.

Chromium Sulphate, Basic. Crystals, d/d, per lb., 8½d; per ton, £79 6s 8d.

Citric Acid—Granular. In kegs, 1-4 cwt. lots, per cwt., £10 1s; 5-19 cwt. lots, per cwt., £9 17s; 1-ton lots, per cwt., £9 16s; packed in paper bags, 1-4 cwt. lots, per cwt., £9 13s; 5-19 cwt. lots, per cwt., £8 19s; 1-ton lots, per cwt., £9 8s.

Cobalt Oxide. Black, per lb., d/d, bulk quantities, 13s 2d.

Copper Carbonate. Per lb., 3s 6d.

Copper Sulphate. £75 15s per ton less 2% f.o.b. Liverpool.

Cream of Tartar. 100%, per cwt., about £11 12s.

Formaldehyde. In casks, d/d, £40.

Formic Acid. 85%, in 4-ton lots, c.p., £91.

Glycerine. Chem. pure, double distilled 1.2627 s.g., per cwt., in 5-cwt. drums for annual purchases of over 5-ton lots and under 25 tons, £12 1s 6d. Refined technical grade industrial, 5s per cwt. less than chem. pure.

Hydrochloric Acid. Spot, per carboy, d/d (according to purity, strength and locality), about 12s.

Hydrofluoric Acid. 60%, per lb., about 1s 2d.

Hydrogen Peroxide. Carboys extra and ret. 27.5% wt., £115; 35% wt., d/d, £138.

These prices are checked with the manufacturers, but in many cases there are variations according to quality, quantity, place of delivery, etc.
Abbreviations: d/d, delivered; c.p., carriage paid; ret., returnable; non-ret. pack., non-returnable packaging; tech., technical; comm., commercial; gran., granular.

All prices per ton unless otherwise stated

Iodine. Resublimed BP, under 1 cwt., per lb., 11s 6d; for 1-cwt. lots, per lb., 11s 3d.

Iodoform. Under 1 cwt., per lb., 24s 1d; for 1-cwt. lots, per lb., 23s. 5d; crystals, 3s more.

Lactic Acid. Edible, d/d, 50% by wt., per lb., 16½d; 80% by wt., 26½d; C.P., 50% by wt., per lb., 14½d; 80% by wt., 23d; dark tech., ex-works, 44% by wt., per lb. 9d. 1-ton lots, loaned containers.

Lead Acetate. White, about £154.

Lead Nitrate. 1-ton lots, about £135.

Lead, Red. Basic prices: 15-cwt. drum lots, Genuine dry red, £102 5s per ton; orange lead, £114 5s per ton; Ground in oil: red, £123 5s, orange, £135 5s.

Lead, White. Basic prices: in 5-cwt. drums, per ton for 2 ton lots, Dry English £115 5s; Ground in oil, £134 5s.

Lime Acetate. Brown, ton lots, d/d, £40; grey, 80-82%, ton lots, d/d, £45.

Litharge. In 5-cwt. drum lots, £104 5s per ton.

Magnesite. Calcined, in bags, ex-works, about £21.

Magnesium Carbonate. Light, comm., d/d, 2-ton lots, £84 10s under 2 tons, £97.

Magnesium Chloride. Solid (ex-wharf), £17 10s per ton.

Magnesium Oxide. Light, comm., d/d, under 1-ton lots, £245.

Magnesium Sulphate. Crystals, £13 10s, ex-works.

Mercuric Chloride. Tech. powder, per lb., for 1-ton lots, in 28-lb. parcels, 20s; 5-cwt. lots, in 28-lb. parcels, 20s 6d; 1-cwt. lots, in 28-lb. parcels, 20s 9d.

Mercury Sulphide, Red. 5-cwt. lots in 28-lb. parcels, per lb., £1 10s 6d; 1-cwt. lots, £1 11s.

Nickel Sulphate. D/d, buyers UK, nominal, £170.

Nitric Acid. 80° Tw., £35 2s.

Oxalic Acid. Home manufacture, min. 4-ton lots, in 56 lb. paper bags, c.p., about £125-£130.

Phosphoric Acid. TPA 1,700, ton lots, c.p., £103; BP (s.g. 1,750), ½-ton lots, c.p., per lb., 1s 4d.

Potash, Caustic. Solid, 1-ton lots, £95 10s; liquid, £36 15s.

Potassium Carbonate. Calcined, 96/98%, 1-ton lots, ex-store, about £76.

Potassium Chloride. Industrial, 96%, 1-ton lots, about £24.

Potassium Dichromate. Gran., per lb., in 5-cwt. to 1-ton lots, d/d UK, 1s 2½d.

Potassium Iodide. BP, under 1 cwt, per lb., 9s 0d., per lb for 1-cwt lots, 8s 9d.

Potassium Nitrate. 4-ton lots, in non-ret. pack, c.p., £63 10s.

Potassium Permanganate. BP, 1-cwt. lots, per lb., 1s 11¾d; 3-cwt. lots, per lb., 1s 11½d; 5-cwt. lots, per lb., 1s 10¾d; 1-ton lots, per lb., 1s 10½d; 5-ton lots, per lb., 1s 10d. Tech., 1-ton lots in 1-cwt. drums, per cwt., £9 18s; 5-cwt. in 1-cwt. drums, per cwt., £10; 1-cwt. lots, £10 9s.

Salammoniac. Ton lot, in non-ret. pack, £47 10s.

Salicylic Acid. MANCHESTER: Tech., d/d, per lb., 2s 6d, cwt. lots.

Soda Ash. 58% ex-depot or d/d, London station, 1-ton lots, about £16 11s 6d.

Sodium Acetate. Comm. crystals, d/d, £75 8s.

Soda, Caustic. Solid 76/77%; spot, d/d 1-ton lots, £33 16s 6d.

Sodium Bicarbonate. Ton lot, in non-ret. pack, £12 10s.

Sodium Bisulphite. Powder, 60/62%, d/d 2-ton lots for home trade, £46 2s 6d.

Sodium Carbonate Monohydrate. Ton lot, in non-ret. pack, c.p., £64.

Sodium Chlorate. 1-cwt. drums, c.p. station, in 4-ton lots, about £76 10s. per ton.

Sodium Cyanide. 96/98%, ton lot in 1-cwt. drums, £126.

Sodium Dichromate. Gran. Crystals per lb., 1s. Net d/d UK, anhydrous, per lb., 1s 1¾d. Net del. d/d UK, 5-cwt. to 1-ton lots.

Sodium Fluoride. D/d, 1-ton lots and over, per cwt., £5; 1-cwt. lots, per cwt., £5 10s.

Sodium Hyposulphite. Pea crystals, £38; comm., 1-ton lots, c.p., £34 15s.

Sodium Iodide. BP, under 56 lb. per lb., 11s 3d; 56 lb. and over, 11s 0d.

Sodium Lactate. Edible, 75%, per ton, £168, d/d free drums, 1-ton lots.

Sodium Metaphosphate. Flaked, paper sacks, £136.

Sodium Metasilicate. (Spot prices) D/d UK in 1-ton lots, 1-cwt. free paper bags, £29.

Sodium Nitrate. Chilean refined gran. over 98%, 6-ton lots, d/d c.p., per ton, £29.

Sodium Nitrite. 4-ton lots, £32.

Sodium Perborate. (10% available oxygen) in 1-cwt. free kegs, 1-ton lots, £129 10s; in 1-cwt. lots, £139 5s.

Sodium Percarbonate. 12½% available oxygen, in 1-cwt. kegs, £170 15s.

Sodium Phosphate. D/d, ton lots: di-sodium, crystalline, £40 10s, anhydrous, £89; tri-sodium, crystalline, £39 10s, anhydrous, £87.

Sodium Silicate. (Spot prices) 75-84° Tw. Lancs and Ches., 6-ton lots, d/d station in loaned drums, £12 10s; Dorset, Somerset and Devon, per ton extra, £3 5s; Scotland and S. Wales, extra. £2 17s 6d. Elsewhere in England, not Cornwall, extra, £1.

Sodium Sulphate [Desiccated Glauber's Salt]. D/d in bags, about £19.

Sodium Sulphate [Glauber's Salt]. D/d, up to £14.

Sodium Sulphate [Salt Cake]. Unground, d/d station in bulk, £10.
MANCHESTER: d/d station, £10 10s.

Sodium Sulphide. 60/62%, spot, d/d, in drums in 1-ton lots, solid, £38 2s 6d; broken, £39 2s 6d. Flakes, £40 12s 6d, crystals, £29 10s.

Sodium Sulphite. Anhydrous, £71 10s; comm., d/d station in bags, £27-£28 10s.

Sulphur. 4 tons or more, ground, according to fineness, £20-£22.

Sulphuric Acid. Net, naked at works, 168° Tw. according to quality, £9 15s.—£11 7s 6d per ton; 140° Tw., arsenic free, £8 2s 6d; 140° Tw., arsenious, £7 17s 6d.

Tartaric Acid—Powder and Granular. Per cwt.: 10 cwt. or more, in kegs, 300s; in bags, 292s per cwt.

Titanium Oxide. Standard grade comm., rutile structure, £178; standard grade comm., anatase structure, £163.

Zinc Oxide. Per ton: white seal, £100. green seal, £98; red seal, £95

SOLVENTS AND PLASTICISERS

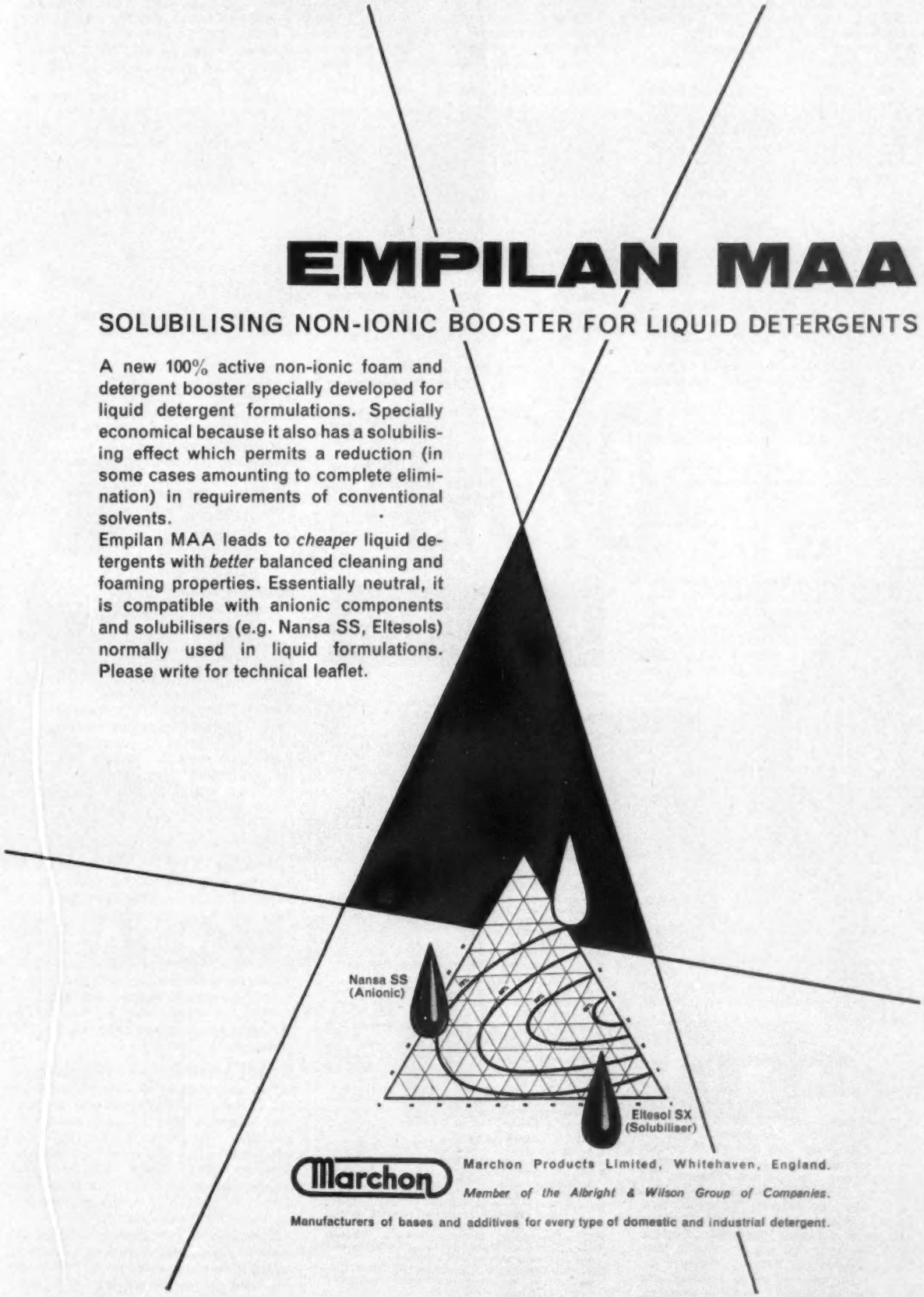
Acetone. All d/d. In 5-gal. drums, £124; in 10-gal. drums, £114; in 40-45 gal. drums, under 1 ton, £89; 1-5 tons, £84;

EMPILAN MAA

SOLUBILISING NON-IONIC BOOSTER FOR LIQUID DETERGENTS

A new 100% active non-ionic foam and detergent booster specially developed for liquid detergent formulations. Specially economical because it also has a solubilising effect which permits a reduction (in some cases amounting to complete elimination) in requirements of conventional solvents.

Empilan MAA leads to *cheaper* liquid detergents with *better* balanced cleaning and foaming properties. Essentially neutral, it is compatible with anionic components and solubilisers (e.g. Nansa SS, Eltesols) normally used in liquid formulations. Please write for technical leaflet.



Marchon

Marchon Products Limited, Whitehaven, England.

Member of the Albright & Wilson Group of Companies.

Manufacturers of bases and additives for every type of domestic and industrial detergent.

MAB 796

97

5-10 tons, £82; 10 tons and up, £80; in 500-gal. tank wagons, £79. In bulk minimum 2,500 gal. £75 per ton.

Butyl Acetate BSS. 10-ton lots, £165.

***n*-Butyl Alcohol BSS.** 10 tons, in drums, d/d, £137 10s.

***sec*-Butyl Alcohol.** All d/d. In 5-gal. drums, £168; in 10-gal. drums, £158; in 40-45 gal. drums, under 1 ton, £133; 1-5 tons £130; 5-10 tons, £129; 10 tons and up, £128; in 400-gal. tank wagons, £125.

***tert*-Butyl Alcohol.** 5-gal. drums, £195 10s; 40/45-gal. drums: 1 ton, £175 10s; 1-5 tons, £174 10s; 5-10 tons, £173 10s; 10 tons and up, £172 10s.

Diacetone Alcohol. Small lots: 5-gal. drums, £185; 10-gal. drums, £175. 40/45-gal. drums: under 1 ton, £148; 1-5 tons, £147; 5-10 tons, £146; 10 tons and over, £145, in 400-gal. tank wagons, £142.

Dibutyl Phthalate. In drums, 10 tons, d/d per ton, £216; 45-gal. 1-4 drums, £222.

Diethyl Phthalate. In drums, 10 tons, per ton, £201; 45-gal. 1-4 drums, £207.

Dimethyl Phthalate. In drums, 10 tons, per ton, d/d, £194; 45-gal. 1-4 drums, £200.

Dioctyl Phthalate. In drums, 10 tons, d/d, per ton, £287; 45-gal. 1-4 drums, £293.

Ether BSS. 1-ton lots, drums extra, per lb., 1s 11d.

Ethyl Acetate. 10-ton lots, d/d, £137.

Ethyl Alcohol Fermentation grade (PBF 66 o.p.). Over 300,000 p. gal., 3s 10½d; d/d in tankers, 2,500- 10,000 p. gal. per p. gal., 4s 0½d. D/d in 40/45-gal. drums, p.p.g. extra, 2d.
Absolute alcohol (74.5 o.p.), p.p.g. extra, 2d.

Methanol. Pure synthetic, d/d, £40.

Methylated Spirit. Industrial 66° o.p.: 500-gal. and up, d/d in tankers, per gal., 5s 7½d; 100-499 gal. in drums, d/d per gal., 6s 0½d-6s 2½d. Pyridinised 66° o.p.: 500 gal. and up, in tankers, d/d, per gal., 5s 11d; 100-499 gal. in drums, d/d, per gal., 6s 4d-6s 6d.

Methyl Ethyl Ketone. All d/d. in 40/45-gal. drums, under 1 ton, £143 10s: 1-5 tons, £138 10s: 5-10 tons, £136 10s; 10 tons and up, £143; in 400-gal. tank wagons, £134 10s.

Methyl *iso*Butyl Carbinol. All d/d. In 5-gal. drums, £203; in 10-gal. drums, £193; 40-45 gal. drums, less than 1 ton, £168; 1-9 tons, £165; 10 tons and over, £163; in 400-gal. tank wagons, £160.

Methyl *iso*Butyl Ketone. All d/d. In 5-gal. drums, £209; in 10-gal. drums, £199; in 40/45-gal. drums, under 1 ton, £174; 1-5 tons, £171; 5-10 tons, £170; 10 tons and up, £169; in 400-gal. tank wagons, £166.

***iso*Propyl Acetate.** 10 tons, d/d, 45-gal. drums £132.

***iso*Propyl Alcohol.** Small lots: 5-gal. drums, £118; 10-gal. drums, £108; 40/45-gal. drums: less than 1 ton, £83; 1-9 tons, £81; 10-50 tons, £80 10s; 50 tons and up, £80.

RUBBER CHEMICALS

Carbon Disulphide. According to quality, £61-£67.

Carbon Black. GPF: Ex-store, Swansea. Min. 3-ton lots, one delivery, 6¾d per lb.; min. 1-ton lots and up to 3-tons, one delivery, 7d. per lb.; ex-store, Manchester, London and Glasgow, 7¾d per lb. HAF: ex-store, Swansea; Min. 3-ton lots, one delivery, 7¾d per lb.; min. 1-ton lots and up to 3-tons, one delivery, 8d per lb. Ex-store Manchester, London and Glasgow, 8¾d per lb. ISAF: Min. 3-ton lots in one delivery, 9¾d per lb., min. 1-ton lots and up to 3-tons in one delivery, 10d per lb. Ex-store Swansea, Ex-store Manchester, London and Glasgow, 10¾d per lb.

Carbon Tetrachloride. Ton lots, £83 15s.

India-Rubber Substitutes. White, per lb., 1s 4½d to 1s 7d; dark, d/d, per lb., 1s 0½d to 1s 4d.

Lithopone. 30%, about £57 10s for 5-ton lots.

Mineral Black. £7 10s-£10.

Sulphur Chloride. British, about £5u.

Vegetable Lamp Black. 2-ton lots, £64 8s.

Vermilion. Pale or deep, 7-lb. lots, per lb., 15s 6d.

COAL TAR PRODUCTS

Benzole. Per gal., min. 200 gal., d/d in bulk, 90's, 5s 3d; pure, 5s 7d.

Carbolic Acid. Crystals, d/d bulk, per lb. 1s 3d; 40/50-gal. ret. drums extra, per lb., ½d.

Creosote. Home trade, per gal., according to quality, f.o.r. maker's works, 1s-1s 9d.
MANCHESTER: Per gal., 1s 3d-1s 8d.

Cresylic Acid. Pale 99/100%, per gal., 7s 9d D/d UK in bulk: Pale ADF, per imperial gallon f.o.b. UK, 8s; per US gallon, c.i.f. NY, 103.50 cents freight equalised.

Naphtha. Solvent, 90/160°, per gal., 5s 3d. heavy, 90/190°, for bulk 1,000-gal. lots, d/d, per gal., 4s 1d. Drums extra; higher prices for smaller lots.

Naphthalene. Crude, 4-ton lots, in buyers' bags, nominal, according to m.p.: £22-£30; hot pressed, bulk, ex-works, £40; refined crystals, d/d min. 4-ton lots, £65-£68.

Pitch. Medium, soft, home trade, f.o.r. suppliers' works, £10 10s; export trade, f.o.b. suppliers' port, about £12.

Pyridine. 90/160, per gal., 16s 6d about.

Toluol. Pure, per gal., 5s 2d; 90's 2,000 gal. in bulk, per gal., 5s 0d.
MANCHESTER: Pure, naked, per gal., 5s 6d.

Xylole. According to grade, in 1,000-gal. lots, d/d London area in bulk, per gal., 5s 7d-5s 8d.

INTERMEDIATES AND DYES
(Prices Normal)

***m*-Cresol 98/100%.** 10 cwt. lots d/d, per lb., 4s 9d.

***o*-Cresol 30/31°C.** D/d, per lb., 1s.

***p*-Cresol 34/35°C.** 10 cwt. lots d/d, per lb., 5s.

Dichloraniline. Per lb., 4s 6d.

Dinitrobenzene. 88/99°C., per lb., 2s 1d.

Dinitrotoluene. Drums extra. SP 15°C., per lb., 2s 1½d; SP 26°C., per lb., 1s 5d; SP 33°C., per lb., 1s 2½d; SP 66/68°C., per lb., 2s 1d.

***p*-Nitraniline.** Per lb., 5s 1d.

Nitrobenzene. Spot, 90 gal. drums (drums extra), 1-ton lots, d/d, per lb., 10d.

Nitroanphthalene. Per lb., 2s 5½d.

***o*-Toluidine.** 8-10 cwt. drums (drums extra), per lb., 1s 11d.

***p*-Toluidine.** In casks, per lb., 6s 1d.

Dimethylaniline. Drums extra, c.p., per lb., 3s 2d.

DIARY DATES

MONDAY 30 JANUARY

C.S.—Durham: Univ Science Labs., 5 p.m. 'Development of modern gas kinetics', by Prof. A. F. Trotman-Dickenson.

C.S.—Oxford: Inorganic Chem. Lecture Theatre, Univ., 8.15 p.m. 'Excimers', by Dr. B. Stevens.

R.S.A.—London: John Adam St., Adelphi, W.C.2, 6 p.m. Contor Lecture, 'Modern chemical industry in Britain', by Dr. James Taylor.

TUESDAY 31 JANUARY

C.S. with R.I.C. & S.C.I.—Edinburgh: Biochemistry Lecture Theatre, Univ., New Bldg., Teviot Pl., 7.30 p.m. 'Some hydrocarbon complexes of transition metals', by Prof. P. L. Pauson.

Soc. Inst. Tech.—London: 20 Queen Anne St., W.1. 'Instrumentation past, present & future', by L. S. Yoxall.

WEDNESDAY 1 FEBRUARY

I.Chem.E.—Birmingham: Midland Hotel, 6.30 p.m. 'Diffusivities in aqueous solution', by F. H. Garner & P. J. Martin.

R.I.C.—Walthamstow: S.W. Essex College, 6.30 p.m. Film show.

S.A.C.—London: Burlington Hse., Piccadilly, W.1, 7 p.m. Meeting on 'X-ray fluorescence'.

THURSDAY 2 FEBRUARY

C.S.—Bangor: Univ. Coll. Chemical Dept., 5.45 p.m. 'Very fast chemical reactions', by Prof. G. Porter.

C.S. with S.C.I. & R.I.C.—Bristol: Univ. Chem. Dept., 6.30 p.m. 'Discovery & development of Teryiene', by J. R. Whinfield.

S.C.I.—Nottingham: Gas Showrooms, 7.30 p.m. Jubilee Memorial Lecture: 'British chemical industry—from "K.I.P." to "Outer seven",' by G. Brearley.

Plastics Inst. with I.R.I.—Southampton: Univ. Chem. Dept., 7.30 p.m. 'First year of operation of free trade area with particular reference to rubber & plastics', by L. L. Gordon.

FRIDAY 3 FEBRUARY

C.S.—Birmingham: Univ. Chem. Dept., 4.30 p.m. 'Physical adsorption', by Prof. D. H. Everett.

R.I.C.—Brighton: Techn. Coll., 6.30 p.m. 'Research & development in D.S.I.R. stations', by Sir H. W. Melville.

S.C.I.—Glasgow: Royal College of Sci. & Tech., 7.15 p.m. 'Chemical aspects of research on soil fertility', by Dr. G. W. Cooke.

S.C.I.—Manchester: Robinson Lecture Theatre, Univ., 6.30 p.m. 'Surface active agents in bituminous road materials', by D. H. Mathews.

C.S.—Middlesbrough: Constantine Technical College, 8 p.m. 'Recent studies on many-membered rings', by Prof. R. A. Raphael.

Market Reports

Call for Soda Products

LONDON Steady conditions have prevailed in the industrial chemicals field, with no outstanding feature to record.

The general run of the soda products is meeting with a steady demand with a fair interest in supplies of caustic soda, solid and liquid and in hyposulphite and chlorate of soda. There is also a good call for borax, boric acid and formaldehyde.

The movement in the fertiliser market has been fair, while little change has been reported in the coal tar position.

MANCHESTER In most sections of the Manchester market for heavy chemical products, fairly active conditions have been reported. Some additional forward business has been placed, but the bulk of the new buying has been of spot lots covering a wide range of products. A satisfactorry feature is that the movement of supplies against contracts, including the alkalis and the magnesium and ammonium compounds, keep up at a reasonably good level.

SCOTLAND The past week has been very active in most sections of the Scottish heavy chemical market and in particular demands from the paper and textile industries. The range of chemicals have also been varied and quantities in some instances have shown increases. The question of delivery is still a prominent feature with the bulk of demands mostly for immediate requirements.

Some interest is beginning to be shown towards agricultural chemicals mostly in regard to forward requirements. The week has seen increased activity in exports.

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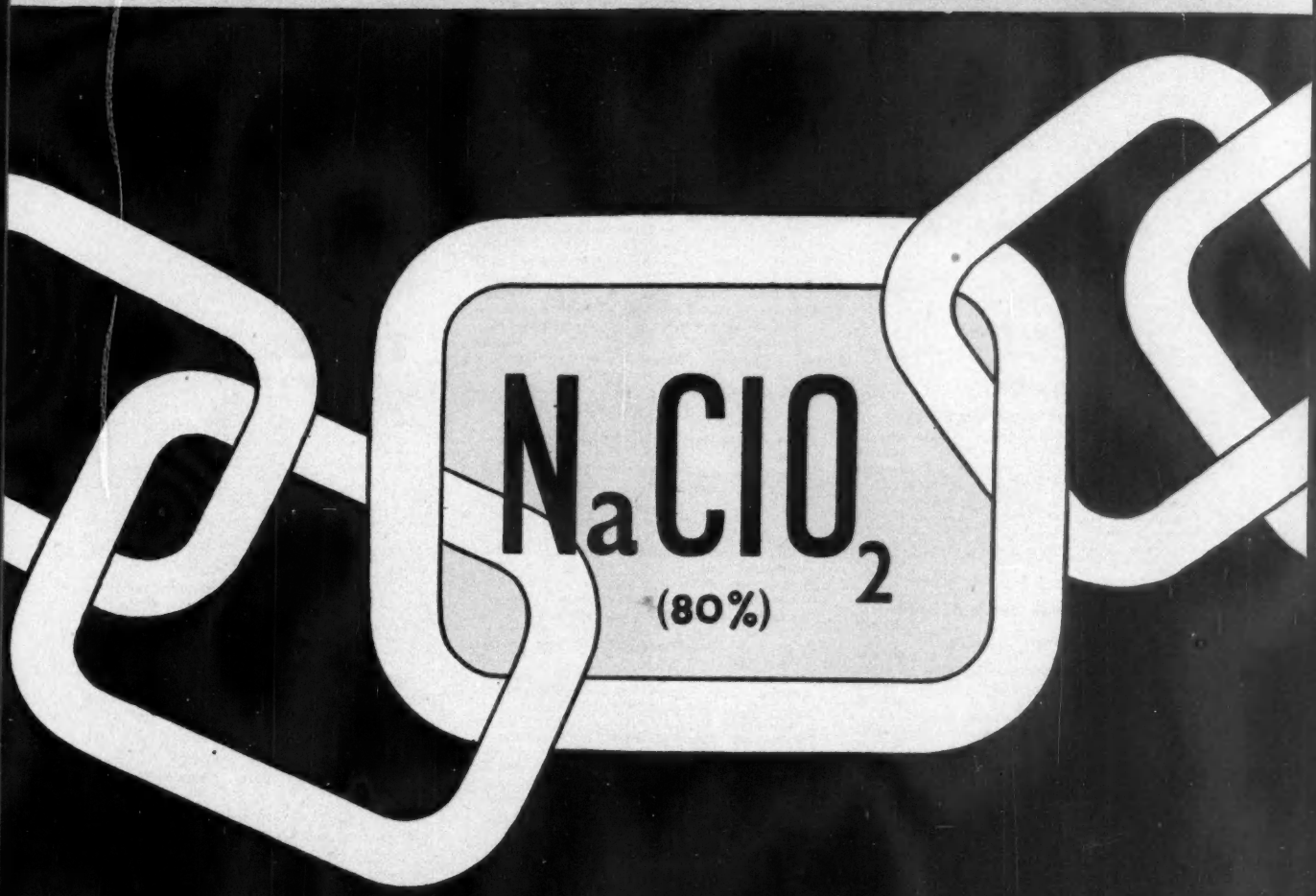

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Specifications filed in connection with the acceptances in the following list will be open to public inspection on the dates shown. Opposition to the grant of a patent on any of the applications listed may be lodged by filing patents form 12 at any time within the prescribed period.

AMENDED SPECIFICATIONS

On Sale 22 February

High molecular weight polyethylenes. Zeigler, K. 799 823

On Sale 1 March

Cellulosic material. Balston Ltd. 838 973

ACCEPTANCES

Open to public inspection 1 March

Derivatives of alpha ionylidene. Nopco Chemical Co. 862 041

Process for the selective extraction of aromatic hydrocarbons from a mixture of both aromatic and non-aromatic hydrocarbons. Hokkaido Tanko Kisen Kabushiki Kaisha. 861 897

Process for the manufacture of halogen substituted aromatic nitriles. Shell Research Ltd. 861 899

Preparation of cyclic nitriles. Shell Research Ltd. 861 898

Amino ethers and their process of preparation. Gaudin, O. P. 861 900

Phenothiazine derivatives. Searle & Co., G. D. 861 897

Electrolytic cells for the decomposition of alkali chlorides. Badische Anilin- & Soda-Fabrik AG. 861 901

Isoquinoline derivatives and salts thereof and a process for the manufacture of same. Hoffmann-La Roche & Co. AG, F. 862 052

Dehydrochlorination of hexachlorohexanes. Becke, F. 861 898

Organic copolymers. Shell Research Ltd. 861 905

Trifluoromethyl-1,2,4-benzothiadiazine-1, 1-dioxide derivatives. Smith Kline & French Laboratories. 861 839

Process for stabilising monovinylacetylene containing impurities. Du Pont de Nemours & Co., E. I. 861 906

Polymeric material. Du Pont de Nemours & Co., E. I. 861 948

Hydrazides, their preparation and compositions containing them. Shell Research Ltd. 861 949

Process for preparing 3-acylamino-2-oxazolidones. Hellinghuizer-Gerriesen, B. [Divided out of 862 206.] 862 207

Thioxanthene derivatives and salts thereof and a process for the manufacture of same. Hoffmann-La Roche & Co. AG, F. [Divided out of 862 200.] 862 202, 862 203

Substituted styryl ketones and a process for the preparation thereof. Hoffmann-La Roche & Co. AG, F. [Divided out of 862 052.] 862 053

Open to public inspection 8 March

Process for the production of dimethyl terephthalate by catalytic oxidation of *p*-xylene and an apparatus for carrying out the process. Majrich, A. 862 391

Production of metal chlorides. Columbia-Southern Chemical Corp. 862 392

Solid propellants. Phillips Petroleum Co. 862 289

Sewage treatment. Dorr-Oliver Inc. 862 504

Metal bearing having low-friction fluorocarbon resin surface. White, C. S. 862 418

Irradiation of polymers. T.I. (Group Services) Ltd. 862 505

Process for the catalytic pressure refining of crude benzene. Koppers GmbH, H. 862 214

Process for the production of dihydro-*m*-thiazines—3, 4". Leuna-Werke W. Ulbricht Veb. 862 368

Steroid compounds and the preparation thereof. Pfizer & Co. Inc., C. 862 370

Batchwise copolymerisation technique. White Laboratories Inc. 862 419

Process for the production of polyolefins. Ruhrchemie AG. 862 429

Process for the production of low-molecular weight polyolefins. Ruhrchemie AG. 862 371

Aqueous elastomer dispersions and preparation thereof. Goodrich Co., B. F. 862 372

Organotin compounds containing epoxy groups and a process for their manufacture. Metal & Thermit Corp. 862 430

Analgesic compositions. National Drug Co. 862 431

Process for preparing steroid compounds. Merck & Co. Inc. 862 383

Cyanine dyes and photographic emulsions containing them. Kodak Ltd. 862 445

Etherified aminoplast condensation products and compositions containing same. Monsanto Chemical Co. 862 384

Method for the preparation of hydrazine derivatives of phosphoric and thiophosphoric acids. Benckiser GmbH, J. A. 862 396

Azo dyestuffs. Imperial Chemical Industries Ltd. 862 269

Compositions containing polymers or copolymers of vinyl pyrrolidone or derivatives thereof. General Aniline & Film Corp. 862 239

Polymerisation process and product. Polymer Corp. Ltd. 862 507

Process for preparation of hydrogen peroxide. Food Machinery & Chemical Corp. 862 272

Lithium salts of tertiary carboxylic acids and hydrocarbon fuels containing them. Du Pont De Nemours & Co., E. I. 862 228

Ion-exchange membranes. Imperial Chemical Industries Ltd. 862 229

Polyurethane foams and method of preparation thereof. Thiokol Chemical Corp. 862 231

Therapeutic compositions of substituted benzodioxanes. Lilly & Co., E. 862 512

Preparation of polyurethanes. Farbenfabriken Bayer AG. 862 232

Pyrrolidine compounds and methods for producing same. Parke, Davis & Co. 862 513

Photosensitive polyamides resin moulding powders. Time Inc. 862 276

Process for the manufacture of polymers in emulsion or suspension. Farbwerke Hoechst AG. 862 492

5-Dibenzo [b.f] azepines and their production. Geigy AG, J. R. 862 297

Protective coatings. Knapsack-Griesheim AG. [Addition to 759 214.] 862 494

1:4-Dioxy-5-acylaminoanthraquinones and process for their manufacture. Ciba Ltd. 862 234

Reserpic acid derivatives and process for their manufacture. Ciba Ltd. 862 390

Dihalogen derivatives of steroids and methods for their production. Abildgaard, K. 862 235

Process for the manufacture of hydrogen peroxide. Laporte Chemicals Ltd. [Addition to 695 779.] 862 497

Monoazo dyestuffs and their metal complex compounds. Sandoz Ltd. 862 374

Copolymeric products. Courtaulds Ltd. 862 499

Production of chloroprene. Distillers Co. Ltd. 862 500

Resin-drug salts. Clinical Products Ltd. 862 242

Dyestuffs of the stilbene series. Imperial Chemical Industries Ltd. 862 225

2-Oxobenzthiazoline derivatives and herbicidal compositions containing them. Boots Pure Drug Co. Ltd. 862 226

Method of producing cellulose acetate fibres having an ability to inhibit the growth of microbes. Sangyoikusei Kabushikikaisha, and Sesoko, M. 862 515

Treatment of polyethylene terephthalate films. Imperial Chemical Industries Co. Ltd. 862 482

N-substituted anilides and acid addition salts thereof. American Cyanamid Co. 862 467

Organosilicon compositions. Midland Silicones Ltd. 862 469

Urea derivative and explosive compositions containing same. Kurokawa, M. 862 407

Sulphur dyestuffs. Cassella Farbwerke Mainkur AG. 862 218

Halogenated silanes and siloxanes. Midland Silicones Ltd. 862 219

Organosilicon resin coating compositions. Midland Silicones Ltd. 862 470

Method for the preparation of unsaturated aliphatic esters. Standard Oil Co. 862 220

Method and apparatus for carrying out exothermic reactions at high temperature and pressure. Chemical Construction Corp. 862 410

Saponification apparatus and method. Kurashiki Rayon Kabushikikaisha. 862 488

Di-isopropylammonium salts of chloracetic and chloropropionic acids. Italaseber S.p.A. 862 248

Herbicidal preparations containing substituted 1,4-naphthoquinones. United States Rubber Co. 862 489

Process for the preparation of moderator graphite for use in nuclear reactors. Shell International Research Maatschappij NV. 862 221

Iso-benzmorphan derivatives. Smith Kline & French Laboratories. 862 249

Thiolcarbamates. Stauffer Chemical Co. [Addition to 808 753.] 862 250

Water-soluble monoazo dyestuffs containing acryloylamino groups and their production. Badische Anilin- & Soda-Fabrik AG. [Addition to 858 183.] 862 318

Process for the production of dibenzthiazyl disulphide. Farbenfabriken Bayer AG. 862 519

Preparation of dihaloboranes, diaminoboranes, boronic acids and esters thereof. United States Borax & Chemical Corp. 862 222

TRADE NOTES

New Shell Polypropylene

The Carlona range of Shell polypropylenes has been revised and extended for the extrusion and injection moulding fields. There are now four grades covering the average melt index range from 0.5 to 4.5. In future Shell polypropylene will be known as Carlona P and the four grades are Carlona P DE61, FE61, HM 61 and KM61. The second letter of the coding system suggests the end use—E for extrusion and M for injection moulding.

Surface Active Agents

Sipon Products Ltd. have introduced two new surface active agents. Siponaol O, sodium dioctyl sulphosuccinate, is a surface active agent belonging to the anionic group. It can be used wherever a wetting, dispersing or solubilising agent is required.

The Bacfor series of quaternary ammonium bromides has been increased by the addition of quaternary ammonium chlorides, the Bacfor C series. This is a series of cationic germicides of use in bactericidal and bacteriostatic applications (see also CHEMICAL AGE, 21 January, p. 148).

Emulsions for Water Based Paints

A technical information leaflet, No. 301, describing the use of Scott Bader products in water based paints has recently been published. The leaflet reviews three new emulsions, the Texicote VR series, Texicote VAC 555 and the Texicryl AM 655, which are respectively a polyvinyl acetate series of emulsions, a new vinyl/acrylic copolymer emulsion and a 55% solids acrylic copolymer emulsion which have been specifically designed for the production of high quality emulsion paints. Several of the company's standard products have also been reviewed.

Cellobond Price Cut

British Resin Products have reduced the U.K. price of Cellobond H.832. The prices are now 2s 11d per lb. for lots of 1 ton and over and 3s, 3s 1d and 3s. 5d. per lb. for lots of 10, 5, and for 1 cwt. and below, respectively.

Commercial News

British Oxygen

Group profit of the British Oxygen Co. Ltd. for the year ended 30 September 1960 totalled £9,515,941, a rise of 18% on the previous figure of £8,587,144, after depreciation of £4,747,023 (£4,339,723). The profit increase came almost entirely from sales expansion overseas; greater turnover at home was offset by higher wages and other costs, particularly in the last few months, and profit margins narrowed.

Net additions to fixed assets, £6.3 million, stock and work in progress, £13.5 million, and capital commitments, £6.9 million, are all up on last year, because of substantial aditions being made to production capacity. A final dividend of 10% is recommended, making 16% (14%) (see also p. 174).

Fisons Ltd.

As a result of their offer for the ordinary shares of Pickering and West Ltd., Fisons Ltd. have acquired 799,710 out of a total of 800,000 shares. It is intended to acquire the small outstanding balance compulsorily.

Glaxo-Evans Medical

Glaxo Laboratories Ltd. forecast a dividend of not less than 15% on the capital as increased by the recent one-for-four scrip issue and by the issue of shares against the proposed acquisition of Evans Medical Ltd. Adjusting for the scrip issue the Glaxo total for 1959-1960 was equal to 14.4%.

The directors of Evans state that prospects in combination with Glaxo are better than those for Evans Medical alone. They estimate that Evans net profits before tax for 1960 will show an increase comparable with the growth of earnings in 1959 over the year before. The 1959 group figure was £397,896, against £331,341. They consider that the final dividend they would recommend would not be as much as the special 10% interim to be paid if the offer becomes unconditional.

Owing to the world-wide trade of Glaxo (60% overseas) it is not possible to forecast the trading figures for the first six months of the current year before the interim report is issued next April. If acquired, Evans will continue to trade under their present identity. The present board will remain in office with representation on the Glaxo board, which would be similarly represented on the Evans board.

Benn Brothers

The directors of Benn Brothers Ltd., publishers of CHEMICAL AGE, have declared a dividend of 3% on ordinary for the half-year to 31 December (same, after allowing for capital reorganisation February 1960).

Allied Laboratories, Inc.

Allied Laboratories, Inc., U.S., manufacturers of pharmaceutical and biological products used for prevention and treatment of human and animal diseases, have been acquired by the Dow Chemical Co., Midland, Mich.

Texaco Belgium

Texaco Belgium is the name of a company formed in Brussels by Texaco Panama with a capital of B.Fr.1,250,000. The company's main task will be trading in petrochemicals.

INCREASES OF CAPITAL

BRITISH DRUG HOUSES LTD. Increased by £500,000 beyond the registered capital of £2¼ million.

CHEMICALS TRADING CO. LTD., 18/20 Creechurch Lane, London E.C.3. Increased by £5,000 beyond the registered capital of £10,000.

GEIGY S.P.A., Milan, increased from Lire 99 million to Lire 500 million. The company is a subsidiary of J. R. Geigy S.A., Basle.

W. S. SIMPSON AND CO. (THE BRITISH ANILINE DYE AND CHEMICAL WORKS) LTD., 1/22 Linden Way, London N.14. Increased by £20,000 beyond the registered capital of £10,000.

JOHN AND E. STURGE LTD. Increased by £1 million beyond the registered capital of £500,000.

VEDEPHA VERTRIEB VON TEERFARBEN, CHEMISCHEN UND PHARMAZEUTISCHEN PRODUKTEN GMBH, of Vienna, a subsidiary of Farbwerke Hoechst AG, Frankfurt-on-Main, have raised their capital from Sch4,900,000 to Sch15 million.

SULPHIDE CORPORATION PTY. LTD., subsidiary of Consolidated Zinc Corporation, have raised their capital from £5 million to £7,500,000.

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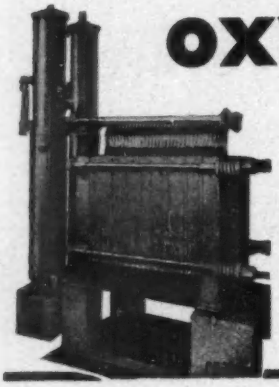

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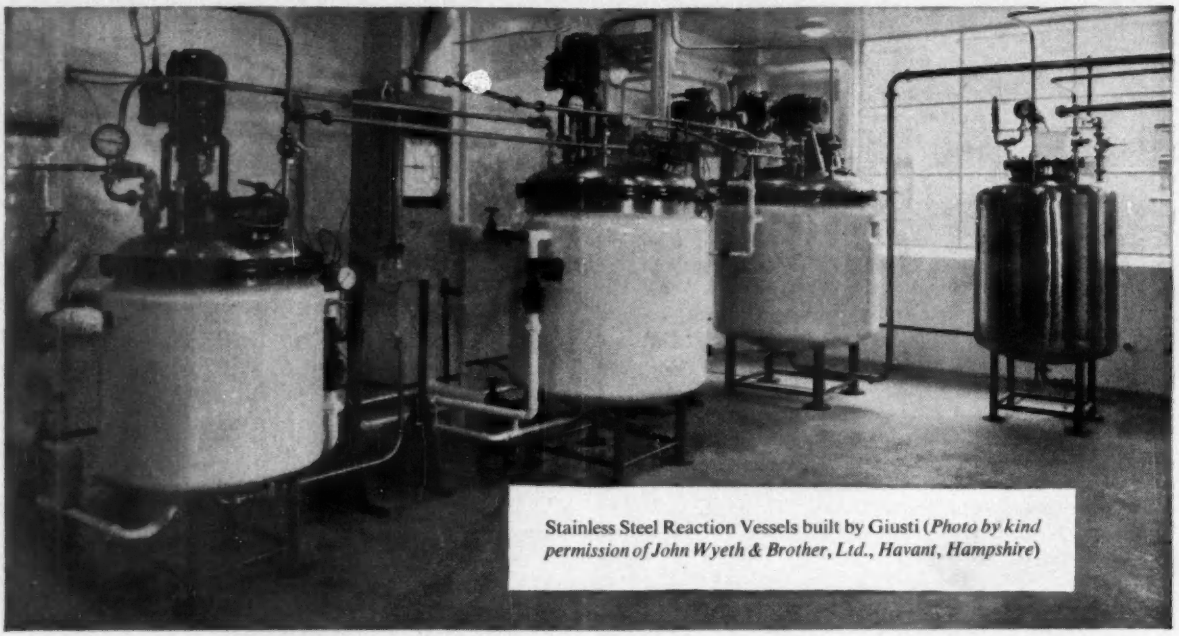

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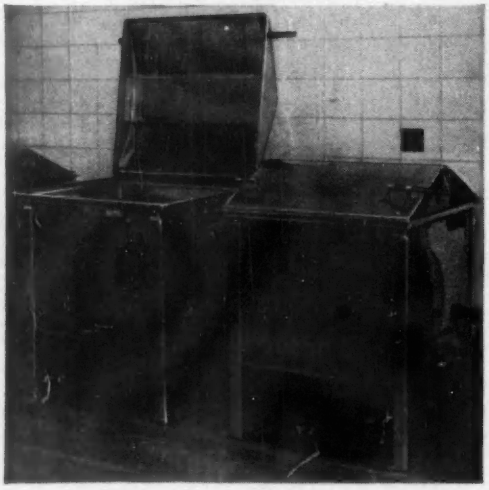

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